

INTERNATIONAL
STANDARD

ISO/IEC
8613-11

First edition
1995-11-15

**Information technology — Open
Document Architecture (ODA) and
interchange format: Tabular structures and
tabular layout**

*Technologies de l'information — Architecture de documents ouverts
(ODA) et format d'échange: Structures tabulaires et disposition tabulaire*



Reference number
ISO/IEC 8613-11:1995
AVA Documents
Document Sharing Hub

Contents

	<i>Page</i>
1 Scope	1
2 Normative references	2
2.1 Identical Recommendations International Standards	2
2.2 Paired Recommendations International Standards equivalent in technical terms	2
3 Definitions	2
4 Abbreviations	4
5 Conventions	4
5.1 Content associated with a composite logical object	4
5.2 The symbol /	4
6 Relationship to ITU-T Recommendation T.412 ISO/IEC 8613-2	5
7 Features of tabular structures and tabular layout	5
7.1 Content types and inner structures of table entries	6
7.2 Dimensions of tables, rows and columns	6
7.3 Placement of tables	6
7.4 Spanning cells	6
7.5 Placement of table entries	6
7.5.1 Gutter space around table lines	6
7.5.2 Offset of table entries	7
7.5.3 Alignment of a table entry within a table cell	7
7.5.4 Reference line alignment	7
7.6 Split of tables	7
7.6.1 Direction of table split	7
7.6.2 Repetition of headings	7
7.7 Rendition of table lines	8
7.8 Supplementary lines	8
8 Grid logical components	8
8.1 Logical grids	8
8.1.1 Logical grid lines and logical grid locations	8
8.1.2 Major and minor paths	8
8.1.3 Major and minor logical grid lines	8
8.1.4 Major and minor sizes of a logical grid	9
8.1.5 Logical coordinates	9
8.1.6 Logical grid rectangles	9
8.2 Association of entry objects with logical grid rectangles	9

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Printed in Switzerland

9	Grid frame components	10
9.1	Layout grid	11
9.1.1	Layout grid lines	11
9.1.2	Major and minor paths	11
9.1.3	Major and minor layout grid lines	11
9.1.4	Grid line segments	13
9.1.5	Major and minor sizes of a layout grid	13
9.1.6	Major and minor dimensions of a layout grid	13
9.1.7	Grid intervals, layout grid locations and layout grid rectangles	13
9.1.8	Dimensions of grid intervals	14
9.1.9	Naming of edges of a layout grid rectangle	15
9.1.10	Grid gutter spaces	16
9.1.11	Position of a layout grid	16
9.1.12	Minimal layout of a layout grid	17
9.2	Association of grid frames with grid logical objects	17
9.3	Binding of entry frames to layout grid rectangles	17
9.3.1	Correspondence between layout grid lines and logical grid lines	18
9.3.2	Correspondence between layout grid rectangles and logical grid rectangles	18
9.3.3	Layout of content associated with entry objects	18
10	Duplication of content	18
10.1	Reproductions of content	18
10.1.1	Reproductions of the content of a basic logical object	18
10.1.2	Reproductions of the content of a target object	19
10.1.3	Reproduction bundles	19
10.2	Layout of content within reproductions	19
10.2.1	Order of layout	19
10.2.2	Splits of content portions	19
10.2.3	Effects of layout directive attributes on layout	20
10.3	Content identifiers for reproductions	22
11	Expressions	22
11.1	Grid construction expressions	22
11.2	Attributes with grid construction expressions as values	23
11.3	Grid interval expressions	24
11.4	Interval indicators	24
11.5	Grid gutter expressions	26
11.6	Gutter indicators	27
11.7	Grid line expressions	27
11.8	Line characteristics	27
11.9	Line characteristic expressions	28
11.10	Line segment characteristics	28
12	Attribute definitions	29
12.1	Layout attributes	29
12.1.1	Frame alignment point	29
12.1.2	Grid dimensions	31
12.1.3	Grid gutters	31
12.1.4	Grid interval dimensions	33
12.1.5	Grid lines	34
12.1.6	Grid position	36
12.1.7	Indent – major;	38
	Indent – minor	38

12.1.8	Major path.....	40
12.1.9	Minor path.....	40
12.1.10	Position	40
12.1.11	Reference line alignment – major;	47
	Reference line alignment – minor	47
12.1.12	Supplementary lines.....	51
12.2	Layout directive attributes	52
12.2.1	Block alignment point.....	52
12.2.2	Grid description	53
12.2.3	Grid frame classes.....	55
12.2.4	Obligatory same layout objects.....	55
12.2.5	Presentation precedence.....	57
12.2.6	Selective same layout objects	59
12.2.7	Supplementary line directive	60
12.3	Presentation attributes	61
12.3.1	Character content architecture	61
12.3.2	Raster graphics content architecture	63
12.3.3	Geometric graphics content architecture.....	63
13	Reference model of the document layout process with respect to tabular layout	65
13.1	Layout of reproductions of content.....	65
13.2	Layout reference from a grid logical object to grid frames	65
13.3	Determination of the dimensions of layout grids.....	66
13.3.1	Constraints on the dimensions of layout grids	66
13.3.2	Minimal layout of the layout grid	66
13.4	Determination of the imaging factors of table lines.....	67
13.5	Processing order of basic logical objects	67
13.6	Placement of an entry frame not bound to a grid rectangle	68
13.7	Placement of an entry frame bound to a grid rectangle	68
13.7.1	Determination of the area available for placement of entry frames	68
13.7.2	Placement of an entry frame within its available area	75
13.7.3	Placement of temporarily positioned entry frames	78
13.7.4	Rectification of position of entry frames with centre order	79
14	Reference model of the document imaging process with respect to tabular layout	80
14.1	Generation of images of layout grid lines	80
14.1.1	Direction of a grid line segment.....	80
14.1.2	Position and dimension of a grid line segment	80
14.1.3	Imaging factors for a grid line segment	81
14.2	Generation of images of supplementary lines.....	81
Annex A	Formal definition of tabular structures and tabular layout.....	82
A.1	Layout descriptors.....	82
A.2	Logical descriptors.....	84
A.3	Style descriptors.....	84
A.4	Default value lists	85
A.5	Character presentation attributes.....	85
A.6	Raster graphics presentation attributes.....	86
A.7	Geometric graphics presentation attributes	87
A.8	Grid layout descriptors.....	87
A.9	Grid style descriptors	90

Annex B – Formal definition of tabular structures and tabular layout	92
B.1 Example 1	92
B.1.1 Generic Layout Structure	92
B.1.2 Explanation	94
B.2 Example 2	95
B.2.1 Generic Logical Structure	95
B.2.2 Specific Logical Structure	96
B.2.3 Specific Layout Structure	97
B.2.4 Explanation	100
B.3 Example 3	104
B.3.1 Generic Logical Structure	104
B.3.2 Specific Logical Structure	104
B.3.3 Specific Layout Structure	106
B.3.4 Explanation	108
B.4 Example 4	110
B.4.1 Generic Logical Structure	110
B.4.2 Specific Logical Structure	110
B.4.3 Explanation	111
B.5 Example 5	111
B.5.1 Generic Logical Structure	111
B.5.2 Specific Logical Structure	112
B.5.3 Generic Layout Structure	118
B.5.4 Layout Style	119
B.5.5 Explanation	120
B.6 Example 6	121
B.6.1 Generic Logical Structure	121
B.6.2 Specific Logical Structure	121
B.6.3 Generic Layout Structure	121
B.6.4 Layout Style	123
B.6.5 Explanation	124
B.7 Example 7	125
B.7.1 Generic Logical Structure	125
B.7.2 Layout Styles	126
B.7.3 Presentation Styles	127
B.7.4 Generic Layout Structure	127
B.7.5 Specific Logical Structure	128
B.7.6 Explanation	129

List of Figures

1	Logical grid	9
2	Association of entry objects with logical grid rectangles.....	10
3	Layout grid	11
4	Layout grid lines	12
5	Grid intervals.....	14
6	Grid interval dimensions	15
7	Edges of grid rectangles	16
8	Grid origin and grid reference point.....	17
9	Gutter spaces	32
10	Grid origin and grid reference point.....	37
11	Major alignment of grids.....	38
12	Indent – major	39
13	Example of first typical case of placement of entry frames with centre order	46
14	Example of second typical case of placement of entry frames with centre order	46
15	Quasi alignment groups.....	48
16	Alignment groups.....	49
17	Presentation of reference lines	50
18	Processing order of basic logical objects	58
19	Alignment points in the character content architecture	62
20	Alignment points in the raster graphics content architecture	64
21	Available area for an entry frame with normal order.....	71
22	Available area for an entry frame with centre order	72
23	Available area for an entry frame with reverse order.....	73
24	Reference line alignment.....	78
B.1	Generic Layout Structure of Example 1	93
B.2	Example 1.....	94
B.3	Generic Logical Structure of Example 2	95
B.4	Specific Structures of Example 2	96
B.5	Formatted Table of Example 2.....	96
B.6	Placement of Entry Frame within Grid Rectangle	97
B.7	Overflow of Table Contents	109
B.8	Table with Raster Contents	111
B.9	Generic Logical Structure of Example 5	112
B.10	Specific Logical Structure of Example 5	117
B.11	Layout of Example 5	120
B.12	Indentation.....	121
B.13	Cut-in heads	125
B.14	Redundant duplication of table headings	126
B.15	Reference Line Alignment	129

List of Tables

1	Types of grid construction expression	23
2	Positions of grid origins and grid reference points	37

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 8613-11 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.421.

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*

Annex A forms an integral part of this part of ISO/IEC 8613. Annex B is for information only.

Introduction

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

At present, the ITU-T Set of Recommendations in the T.410-Series | International Standard 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 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 Recommendation | International Standard.

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

- Annex A – Formal definition of tabular structures and tabular layout.
- Annex B – Examples.

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN DOCUMENT ARCHITECTURE (ODA) AND INTERCHANGE FORMAT: TABULAR STRUCTURES AND TABULAR LAYOUT

1 Scope

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

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

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

In addition to the content type 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 communications 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 Recommendation | International Standard:

- defines a document architecture, in order to allow presentation and processing of tabular material, that can be used in conjunction with the document architecture defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2;
- defines two types of components, the grid logical component and the grid frame component, which are characterized by association with grids;
- defines the layout attributes and layout directive attributes, in order to allow representation of tabular layout, applicable to this document architecture;
- defines the presentation attributes, in order to allow presentation of tabular layout, applicable to the content architectures defined in ITU-T Recommendation T.416 | ISO/IEC 8613-6, ITU-T Recommendation T.417 | ISO/IEC 8613-7, and ITU-T Recommendation T.418 | ISO/IEC 8613-8;
- describes reference models of the document layout process and the document imaging process which, together with the document processing model described in ITU-T Recommendation T.412 | ISO/IEC 8613-2, determine representation and presentation of tabular layout.

2 Normative references

The following ITU-T Recommendations and International Standards contain provisions which, through references, in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and 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 edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T 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 8613-2:1995, *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.417 (1993) | ISO/IEC 8613-7:1994, *Information technology – Open Document Architecture (ODA) and interchange format: Raster graphics content architectures*.
- ITU-T Recommendation T.418 (1993) | ISO/IEC 8613-8:1994, *Information technology – Open Document Architecture (ODA) and interchange format: Geometric graphics content architectures*.

2.2 Paired Recommendations | International Standards equivalent in technical terms

- 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)*.
- CCITT Recommendation X.209 (1988), *Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)*.
ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.

3 Definitions

In addition to the definitions given in ITU-T Recommendation T.411 | ISO/IEC 8613-1, the definitions listed below apply to this Recommendation | International Standard.

NOTE – The use of the symbol / is described in 5.2.

3.1 dimensions of a layout grid: The height and width of the *layout grid*, measured in scaled measurement units (SMU).

3.2 entry frame: An immediately subordinate frame to a *grid frame* which is variably positioned within the superior grid frame.

3.3 entry frame bound to a layout grid rectangle: An *entry frame* which is to be laid out within the layout grid rectangle to which it is bound.

3.4 entry object: A logical object such that its association with some *logical grid* rectangle within some logical grid is specified.

3.5 entry object occupying a logical grid rectangle: An *entry object* such that its association with this logical grid rectangle is specified.

- 3.6 grid frame:** A frame which is characterized by the capability to include a *layout grid* within it.
- 3.7 grid frame component:** A variant of the composite layout component of frame type which is identified by the value 'grid frame' specified for the attribute "object type".
- 3.8 grid gutter space:** A reserved area around a *layout grid line* from which entry frames are excluded.
- 3.9 grid gutter space width:** The distance between the bordering lines of a *grid gutter space*, measured in scaled measurement units (SMU).
- 3.10 grid interval:** An interval between two adjacent *layout grid lines* which are parallel to each other.
- 3.11 grid interval dimension:** The distance between two adjacent *layout grid lines* in the same direction, measured in scaled measurement units (SMU).
- 3.12 grid line:** A line forming part of a *logical grid* or *layout grid*, which runs parallel to one of the edges of the grid that includes it.
- 3.13 grid logical component:** A variant of the composite logical component which is identified by the value 'grid logical' specified for the attribute "object type".
- 3.14 grid logical object:** A composite logical object which is characterized by its association with a *logical grid*.
- 3.15 *i*-th major / minor grid interval:** The interval between the $(i - 1)$ -th and *i*-th *major / minor layout grid lines*.
- 3.16 *i*-th major / minor layout grid line:** The *major / minor layout grid line* to which the ordinal number *i* is assigned.
- NOTE – The numbering scheme is described in 9.1.3.
- 3.17 *i*-th major / minor logical grid line:** The *major / minor logical grid line* to which the ordinal number *i* is assigned.
- NOTE – The numbering scheme is described in 8.1.3.
- 3.18 layout grid:** A rectangular area within a *grid frame* divided by two sets of parallel *layout grid lines* into one or more *layout grid locations*.
- 3.19 layout grid line:** A line forming part of a *layout grid* which runs parallel to one of the edges of the layout grid.
- 3.20 layout grid location:** A rectangle within a *layout grid* bounded by two pairs of adjacent *layout grid lines*.
- 3.21 layout grid rectangle:** A rectangle composed of one or more *layout grid locations* within a *layout grid*.
- 3.22 logical grid:** A rectangular area associated with a *grid logical object*, divided by two sets of parallel *logical grid lines* into one or more *logical grid locations*.
- 3.23 logical grid line:** A line forming part of a *logical grid* which runs parallel to one of the edges of the logical grid.
- 3.24 logical grid location:** A rectangle within a *logical grid* bounded by two pairs of adjacent *logical grid lines*.
- 3.25 logical grid rectangle:** A rectangle composed of one or more *logical grid locations* within a *logical grid*.
- 3.26 major / minor dimension of a layout grid:** The length, measured in scaled measurement units (SMU), of the edges of the *layout grid* which are parallel to the *major / minor path*.
- 3.27 major / minor grid interval:** An interval between adjacent *major / minor layout grid lines*.
- 3.28 major / minor layout grid line:** A *layout grid line* running parallel to the *minor / major path* of the layout grid that includes it.

- 3.29 major / minor logical grid line:** A *logical grid line* running parallel to the *minor / major path of the logical grid* that includes it.
- 3.30 major path:** A direction within a *logical grid* or *layout grid* parallel to one of the edges of the grid.
- 3.31 major / minor size of a layout grid:** The largest number assigned to a *major / minor layout grid line* within the layout grid.
- 3.32 major / minor size of a logical grid:** The largest number assigned to a *major / minor logical grid line* within the logical grid.
- 3.33 minor path:** A direction within a *logical grid* or *layout grid* orthogonal to the *major path* within the same grid.
- 3.34 reproduction of contents:** A set of one or more content portion descriptions which are reproductions of the content portion descriptions associated with basic logical objects, except that they never include the attribute “content identifier – logical”.

4 Abbreviations

No abbreviations are defined in this Specification.

5 Conventions

In addition to the conventions given in ITU-T Recommendation T.411 | ISO/IEC 8613-1, the following conventions are used throughout this Specification.

5.1 Content associated with a composite logical object

The *content associated with a basic logical object* refers to a collection of content portions which are referred to by the attribute “content portions” specified for the basic logical object. If a content portion is associated with a basic logical object, then the content portion description always includes the attribute “content identifier – logical”.

If the layout process duplicates the content associated with a basic logical object, one or more content portions are generated (see clause 10). Those content portions, as a whole, form part of a single and complete reproduction of the source content except for their identification attributes. In particular, they never include the attribute “content identifier – logical”. Hence, those content positions shall not be associated with any basic logical object, even though their source content is associated with the basic logical object.

The *content associated with a composite logical object* refers to the union of the content associated with the basic logical objects which are, not necessarily immediately, subordinate to the composite logical object.

More shortly, the phrase *the content of a logical object* may be used to refer to the content associated with the logical object, whether the logical object is basic or composite.

5.2 The symbol /

The symbol / between two words indicates that the two words surrounding the symbol / are two alternatives: each alternative makes the sentence including the alternatives true.

When the symbol / appears in texts, this occurrence of the symbol has its own scope. Unless a NOTE specifies a particular scope for it, its scope is confined to the paragraph that includes this occurrence of the symbol.

If the scope includes more than one occurrence of /, and if the reader selects the first alternative at the first occurrence, the text in the scope makes sense when he selects the first alternative at each subsequent occurrence throughout the scope. In the same way, if the reader selects the second alternative at the first occurrence, the text in the scope makes sense when he selects the second alternative at each subsequent occurrence throughout the scope.

Example: If the reader selects the first/second alternative at the first occurrence, the text in the scope makes sense when he selects the first/second alternative at each subsequent occurrence throughout the scope.

6 Relationship to ITU-T Recommendation T.412 | ISO/IEC 8613-2

This Specification provides a document architecture that can be used in conjunction with the document architecture defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2.

This Specification defines 14 layout attributes, 7 layout directive attributes and 3 presentation style attributes. These attributes are defined so that they may represent documents including tabular structures and tabular layout, in both their logical and layout aspects, in conjunction with a number of attributes defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2.

The layout directive attributes:

- obligatory same layout objects;
- selective same layout objects,

impose constraints on the document layout process additional to the layout directive attributes defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2, without affecting their definitions.

This Specification defines two additional object types, *grid logical components* and *grid frame components*.

The layout directive attributes:

- grid descriptions;
- grid frame classes;
- presentation precedence;
- supplementary line directive,

are specifiable only for grid logical components.

The attributes “grid descriptions” and “grid frame classes” are for control of the placement of variably positioned frames within immediately superior grid frames. They never affect the definitions of any layout directive attributes defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2.

The attribute “presentation precedence” is for control of the order in which the document layout process lays out basic logical objects. This attribute may affect such layout directive attributes as “same layout object” and “concatenation”, whose definitions depend on the sequential logical order in specific logical structures. The conjunction of the attribute “presentation precedence” and such attributes may result in unexpected layout, unless the originator generates documents taking interaction between these attributes into consideration.

The attribute “supplementary line directive” is for control of the imaging process to image supplementary lines within grid frames in addition to ordinary grid lines. It never affects the definitions of any layout directive attributes defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2.

This Specification defines a set of particular rules to determine position and dimensions of frames which are immediately subordinate to grid frames. For other frames, the rules defined in ITU-T Recommendation T.412 | ISO/IEC 8613-2 are valid without any changes.

The rest of the attributes defined in this Specification are for the representation of these positioning and dimensioning rules for frames. In particular, the attribute “position” is re-defined in this Specification so that it may provide necessary functions to control placement of frames within immediately superior grid frames.

7 Features of tabular structures and tabular layout

This clause provides a description of the chief features of tabular structures and tabular layout which are in the scope of the document architecture defined in this Specification.

Tabular structures involving some or all of those features are represented in accordance with this document architecture, and those structures are embedded into logical and layout structures of documents represented in accordance with the document architecture of ITU-T Recommendation T.412 | ISO/IEC 8613-2.

Further, the reference model of the document layout process described in this Specification may generate specific layout structures including tabular structures, evaluating those tabular structures embedded into logical structures and generic layout structures.

Thereafter, the reference model of the document imaging process described in this Specification may present tabular structures involved in such specific layout structures as human perceptible tabular layout on rendition media.

This Specification introduces new attributes to cover those features of tabular structures and tabular layout. At the end of each subclause of this clause, those attributes which are related to the feature described in the sub-clause will be listed as **Related attributes**.

Only for illustration in this clause, the following terminology is introduced:

- *table cell*: a rectangular area within a table edged with table lines;
- *table entry*: a piece of content laid out within a table cell;
- *table line*: a visible or invisible line delimiting table entries distributed within a table.

The framework of tabular layout consists of a set of table lines which intersect one another so that the framework shall provide two-dimensional allocation of table cells. Each table entry is laid out within a respective table cell.

7.1 Content types and inner structures of table entries

A table shall allow table entries to contain various types of content, such as character texts, pictures and so forth.

Further, a table shall allow table entries to have an inner structure, such as a picture with a caption, more than one paragraph and so forth.

Related attributes: “grid description”

7.2 Dimensions of tables, rows and columns

The dimensions of a table (height, width), of a row (height), and a column (width) may be specified in one of the following ways:

- the dimension concerned shall be a specified absolute value;
- it shall expand to an area available for its presentation;
- it shall be a minimum value necessary for its presentation.

Additionally, the height of a row and the width of a column may be specified as:

- the dimension concerned shall be in proportion to the dimensions of other particular rows or columns.

Related attributes: “grid dimensions”, “grid interval dimensions”

7.3 Placement of tables

A table may be aligned within the area available for placement in the horizontal and vertical directions:

- the table may be aligned on the left or right, or centred;
- the table may be aligned at the top or bottom, or centred;
- every combination of alignment in the horizontal and vertical directions shall be allowed.

Related attributes: “grid position”

7.4 Spanning cells

A table cell spanning more than one row and more than one column shall be allowed to appear at an arbitrary position within a table.

Related attributes: “grid description”

7.5 Placement of table entries

7.5.1 Gutter space around table lines

A gutter space, from which any table entries are to be excluded, may be reserved around a table line.

Related attributes: “gutters”

7.5.2 Offset of table entries

Offsets of a table entry from the edges of the table cell within which the table entry is laid out shall be specifiable.

Related attributes: “grid position”

7.5.3 Alignment of a table entry within a table cell

A table entry may be aligned within a table cell arbitrarily in the horizontal and vertical directions:

- the table entry may be aligned on the left or the right, or centred;
- the table entry may be aligned at the top or bottom, or centred;
- every combination of alignment in the horizontal and vertical directions shall be allowed.

Related attributes: “position”

7.5.4 Reference line alignment

A table entry may provide an alignment point. If such table entries are in a row or a column, they may be aligned so that all of the alignment points shall be lined up on a reference line in the direction of the row or column. Two of the most typical examples of reference line alignment are *alignment around decimal points* and *base line alignment*.

Related attributes: “reference line alignment – major / minor”, “frame alignment point”, “block alignment point”, “alignment point”

In addition, a table entry involved in reference line alignment may be indented from the reference line concerned.

Related attributes: “indent – major / minor”

After this alignment, the entire set of table entries may be aligned on the left or the right, or centred, within the row or column.

Related attributes: “position”

7.6 Split of tables

When a table overflows such an area available for its presentation as a page, a page column, frame and so forth, the table may or may not split into two or more fragments each of which is presented within an individual available area. Further, each fragment of the table may be presented in a different way: for example, the first fragment includes the area for a table title; the last fragment includes the area for notes; the intermediate fragments include neither.

Related attributes: “grid frame classes”

7.6.1 Direction of table split

When splitting of a table is allowed, it may occur in the horizontal and / or vertical direction:

- a table may be split only at table lines delimiting rows;
- a table may be split only at table lines delimiting columns;
- a table may be split both at table lines delimiting rows and at table lines delimiting columns; in this case, the order of presentation of fragments shall be taken into consideration.

Related attributes: “indivisibility”, “presentation precedence”

Furthermore, in all the cases, the table shall not be split at an unsuitable table line, such as a horizontal table line immediately following box headings.

Related attributes: “same layout object”, “selective same layout objects”

7.6.2 Repetition of headings

When a table is split, such headings within the table as box headings may be repeated within each fragment of the table.

Related attributes: “obligatory same layout objects”

7.7 Rendition of table lines

The method of rendition of a table line shall be determined for each individual line segment composing the table line. For example, if a segment of the table line is within a spanning cell or the stub of the table (the leftmost column for row headings), the line segment shall be rendered invisible.

Related attributes: “grid lines”

7.8 Supplementary lines

In addition to table lines, some supplementary lines may be presented:

- a diagonal line may divide the top left table cell into two triangles;
- a reference line may be rendered visible.

Related attributes: “supplementary lines, supplementary line directive”

8 Grid logical components

A *grid logical component* is a variant of a composite logical component. Any of the attributes applicable to composite logical components are also applicable to a grid logical component. In this Specification, particularly in the **Constituents** clauses of the attribute definitions, grid logical components and ordinary composite logical components may be collectively referred to as “composite logical components”.

A grid logical component is identified by the value ‘grid logical’ specified for the attribute “object type”, and a grid logical object is characterized by the association with a *logical grid*.

Unless the attribute “grid frame classes” is applied to a grid logical object, the layout process shall deal with the grid logical object as an ordinary composite logical object. Hence, those layout directive attributes proper to the grid logical component, namely “grid description”, “presentation precedence” and “supplementary lines” shall never affect the layout of documents.

8.1 Logical grids

8.1.1 Logical grid lines and logical grid locations

The underlying area of a logical grid is a rectangle within an imaginary plane. This underlying rectangle is dissected by two sets of parallel lines. Each set of parallel lines runs parallel to one of two adjacent edges of the underlying rectangle. The lines and divisions so created comprise the logical grid (see Figure 1).

Such a line is called a *logical grid line*, and a division is called a *logical grid location*.

A logical grid line / location may be simply referred to as a *grid line / location* when it is obvious from the context that it is a logical grid line / location rather than a *layout grid line / location*, and vice versa (see 9.1.1 and 9.1.7).

8.1.2 Major and minor paths

The terms *major path* and *minor path* denote the two orthogonal directions within a logical grid which are parallel to the edges of the underlying rectangle.

Conventionally, a logical grid is considered to be upright: the major path is the vertically downward direction, and the minor path is the horizontally rightward direction (see Figure 1).

8.1.3 Major and minor logical grid lines

Every logical grid line runs parallel to either the major or minor path.

A logical grid line running parallel to the minor / major path of a logical grid is called a *major / minor logical grid line*. Within a logical grid, every major / minor logical grid line is identified by an ordinal number (see Figure 1):

- a) the number 0 is assigned to the major / minor logical grid line which is the first in the direction of the major / minor path;
- b) the major / minor logical grid line with number $n + 1$ is adjacent to the major / minor logical grid line with number n in the direction of the major / minor path.

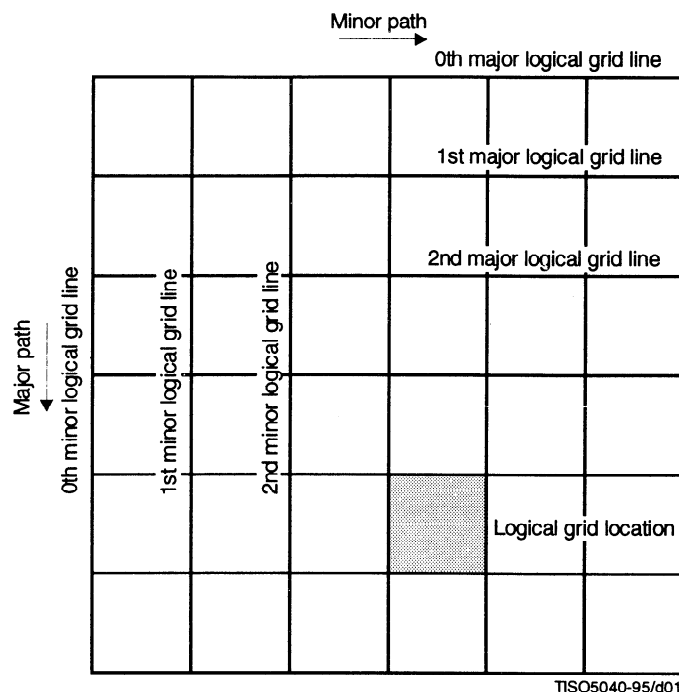


Figure 1 – Logical grid

8.1.4 Major and minor sizes of a logical grid

The *major / minor size* of a logical grid is defined as the largest ordinal number assigned to a major / minor grid line within the logical grid.

The major / minor size of a logical grid is specified by the parameter “major / minor size” of the attribute “grid description” applied to the grid logical object with which the logical grid is associated.

Since a logical grid is conventionally considered to be upright, its major / minor size corresponds to the number of rows / columns within it.

8.1.5 Logical coordinates

Each intersection point of the logical grid is represented by a *logical coordinate pair*: *major logical coordinate* and *minor logical coordinate*.

The major / minor logical coordinate of the point is the ordinal number assigned to the major / minor logical grid line on which the point is located.

Additionally, the special value ‘last’ may be specified for the major / minor logical coordinate. This value specifies that the point is located on the last major / minor logical grid line, to which the largest ordinal number is assigned.

8.1.6 Logical grid rectangles

If one or more logical grid locations comprise a rectangle within a logical grid, the rectangle is called a *logical grid rectangle*. Hence, a logical grid rectangle is edged with a pair of major logical grid lines and a pair of minor logical grid lines.

The smallest logical grid rectangle is a single logical location.

A logical grid rectangle may be called simply a *grid rectangle* when it is obvious from the context that it is a logical grid rectangle rather than a *layout grid rectangle*, and vice versa (see 9.1.7).

8.2 Association of entry objects with logical grid rectangles

A logical object subordinate to a grid logical object may be associated with a logical grid rectangle within the logical grid associated with the grid logical object (see Figure 2). Such a logical object is called an *entry object* occupying that logical grid rectangle. An entry object is not necessarily an immediate subordinate of the grid logical object.

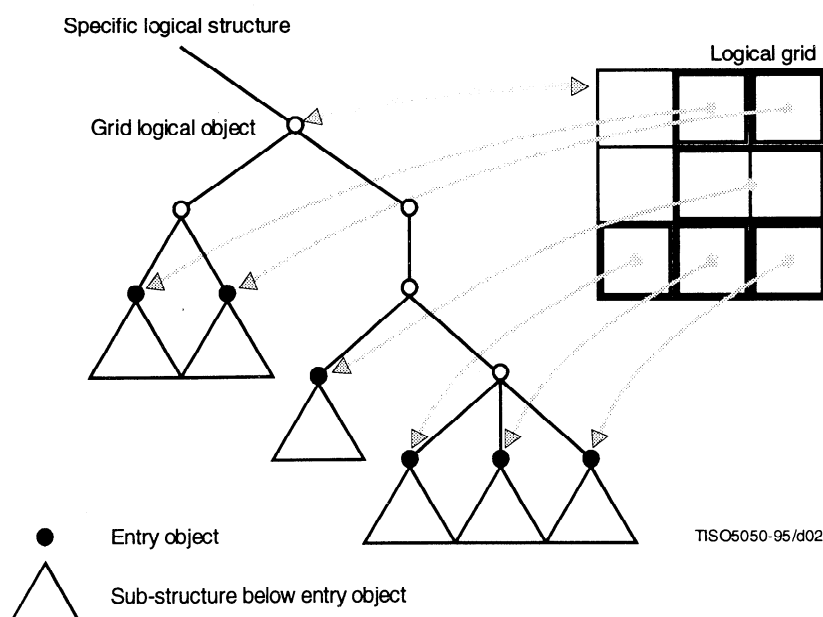


Figure 2 – Association of entry objects with logical grid rectangles

These associations between entry objects and logical grid rectangles are specified by the parameter “entry-location association” of the attribute grid description applied to the grid logical object with which the logical grid is associated (see 12.2.2).

In addition, the associations between entry objects and logical grid rectangles affect the order in which the layout process lays out the content of those basic logical objects that are subordinate to the logical grid object. Therefore, if a grid frame is superior to another grid frame, their effects on this processing order of their common subordinate basic logical objects shall be compatible (see 13.5).

9 Grid frame components

A *grid frame component* can be any frame except a lowest level frame component. Any of the attributes applicable to frame components except the attribute “permitted categories” are also applicable to a grid frame component. In this Specification, particularly in the **Constituents** clauses of the attribute definitions, grid frame components and ordinary frame components may be collectively referred to as “frame components”.

A grid frame component is identified by the value ‘grid frame’ specified for the attribute “object type”, and a grid frame is characterized by the capability to contain a layout grid within it.

A grid frame contains a layout grid whenever the object description for the grid frame specifies the attribute “grid interval dimensions”. Conversely, without the attribute “grid interval dimensions”, the grid frame does not contain a layout grid.

If a grid frame does not contain a layout grid, the imaging process shall deal with the grid frame as if it were an ordinary frame, and shall not present any layout grid lines within it.

When the layout process reach a grid logical object description specifying the attribute “grid frame classes”, the layout process identifies one or more grid frames within the specific layout structure under construction, in accordance with this attribute. Those identified grid frames are called *grid frames referred to* by the grid logical object (see 9.2).

The layout process generates a layout grid within each referenced grid frame. This layout grid includes the same number of major / minor grid lines (see 9.1.1) as the logical grid associated with the grid logical object does.

9.1 Layout grid

9.1.1 Layout grid lines

A *layout grid* is composed of a finite number of lines, called *layout grid lines*. Each layout grid line has its own position, length and direction within the grid frame containing the layout grid.

Layout grid lines within a grid frame satisfy the following constraints:

- every layout grid line shall be parallel with one of the edges of the grid frame;
- no layout grid line shall fall within the border free space of the grid frame;
- every layout grid line shall have its ends located on the same pair of orthogonal grid lines.

Thus, in ordinary cases, a layout grid is a rectangle divided by a finite number of horizontal and vertical lines, each of which has its ends on opposite edges of the rectangle (see Figure 3).

Two layout grid lines may be located at the same position within the grid frame (see 12.1.4). Further, if the layout grid lines running in one of the two directions are all located at the same position, then the length of the layout grid lines in the orthogonal direction shall be zero. In such degenerate cases, where some layout grid line has no positive length, a layout grid is either a line segment or a single point.

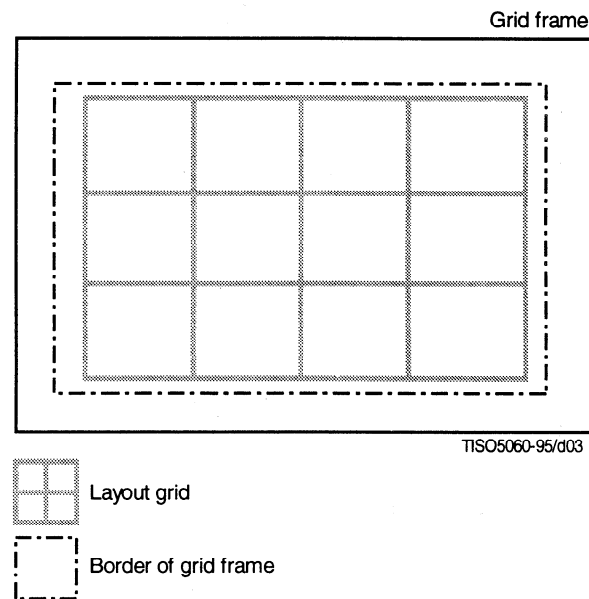


Figure 3 – Layout grid

9.1.2 Major and minor paths

The terms *major path* and *minor path* denote two specified directions within a grid frame which are orthogonal to each other. Further, the major / minor path is parallel with one of the edges of the grid frame.

The attribute “major / minor path” specifies the direction of the major / minor path (see 12.1.8 and 12.1.9).

9.1.3 Major and minor layout grid lines

A layout grid line running in the direction of the minor / major path is called a *major / minor layout grid line*.

Major / minor layout grid lines within a grid frame are identified by successive ordinal numbers assigned to them (see Figure 4).

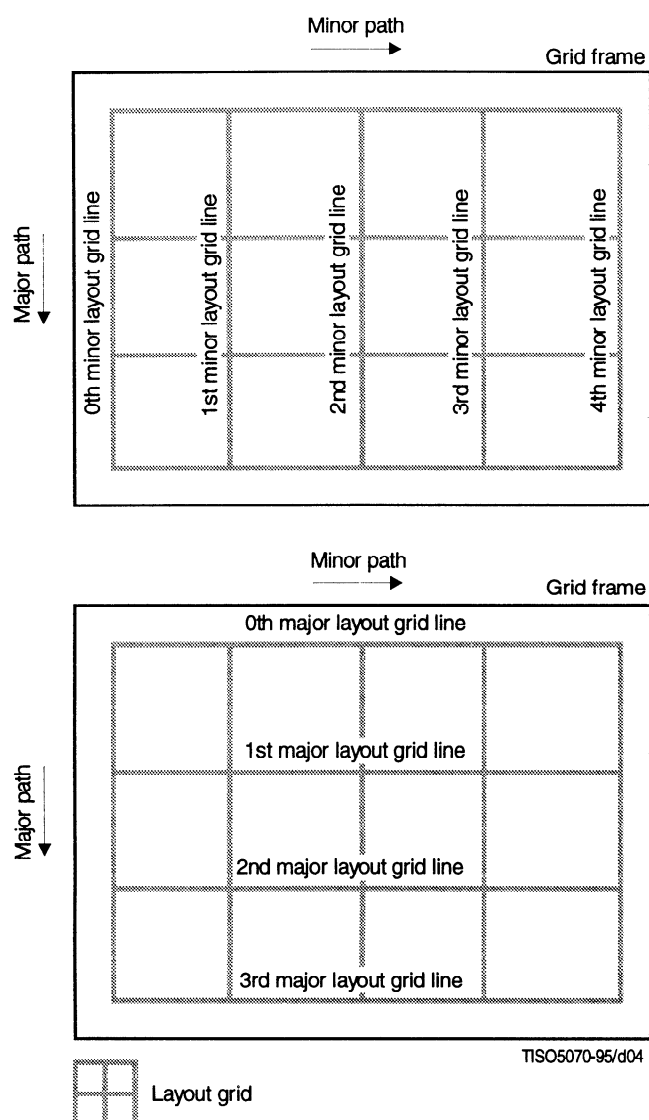


Figure 4 – Layout grid lines

This allocation of numbers shall satisfy the following:

- the smallest number assigned to the major / minor layout grid lines is 0;
- the major / minor layout grid line with number $n + 1$ is either at the same position as the major / minor layout grid line with number n , or is adjacent to it in the direction of the major / minor path.

NOTE – When two or more grid lines occupy the same position, the order in which ordinal numbers are allocated to those lines is arbitrary.

9.1.4 Grid line segments

A *grid line segment* is a segment of a layout grid line delimited by two consecutively numbered layout grid lines intersecting the layout grid line concerned at right angles.

The j -th grid line segment of the i -th major / minor layout grid line is the segment of the i -th major / minor layout grid line, delimited by the $(j - 1)$ -th and j -th minor / major layout grid lines.

Grid line segments are the smallest unit to which a *line segment characteristic* applies (see 11.10). A single line segment characteristic specifies a single set of *imaging factors* (i.e. line width, line type and line colour).

- Each individual grid line segment is imaged with a single line width, a single line type and a single line colour.
- Distinct grid line segments may be imaged with different line widths, different line types or different line colours, even if they are forming part of the common layout grid line.

The attribute “grid lines” applied to the grid frame specifies a set of line segment characteristics, each of which is applicable to each individual grid line segment involved in the relevant layout grid (see 12.1.5).

9.1.5 Major and minor sizes of a layout grid

The largest ordinal number assigned to a major / minor grid line within a layout grid is called the *major / minor size* of the layout grid.

In contrast to the case of a logical grid, where the major and minor sizes of the logical grid are explicitly specified by the attribute “grid description” (see 12.2.2), those of a layout grid are only implicitly specified by the attribute “grid interval dimensions” that the object description for the grid frame specifies (see 12.1.4).

The attribute “grid interval dimensions” consists of two parameters “major interval dimensions” and “minor interval dimensions”. The value of each parameter is a *grid interval expression* of the grid sequence construction type (see 11.1) composed of *interval indicators* (see 11.4), namely a sequence of a finite number of interval indicators, when the attribute is specified for an object description. The number of interval indicators involved in the value of the parameter “major / minor interval dimensions” indicates the major / minor size of the layout grid.

9.1.6 Major and minor dimensions of a layout grid

If an edge of a layout grid is in the direction of the minor / major path specified for the grid frame including the layout grid, its length in scaled measurement units is called the *major / minor dimension* of the layout grid.

The attribute “grid dimensions” applied to the grid frame specifies the major and minor dimensions of the layout grid within the grid frame (see 12.1.2).

9.1.7 Grid intervals, layout grid locations and layout grid rectangles

A *grid interval* is a rectangular area within a layout grid, delimited by two consecutively numbered layout grid lines in the same direction (see Figure 5).

If the grid lines delimiting the grid interval are in the direction of the major / minor path, then the grid interval is called a *major / minor grid interval*. Furthermore, the i -th major / minor grid interval is the major / minor grid interval delimited by the $(i - 1)$ -th and i -th major / minor layout grid lines.

A *layout grid rectangle* is an area within a layout grid edged with two major layout grid lines and two minor layout grid lines. Any grid interval, whether it is major or minor, is a kind of layout grid rectangle.

In particular, a layout grid rectangle is called a *layout grid location* if it is edged with consecutively numbered major layout grid lines and consecutively numbered minor layout grid lines.

In degenerate cases, where the positions of the edging layout grid lines coincide, the grid interval, layout grid rectangle or layout grid location may be a single line segment or a single point in shape.

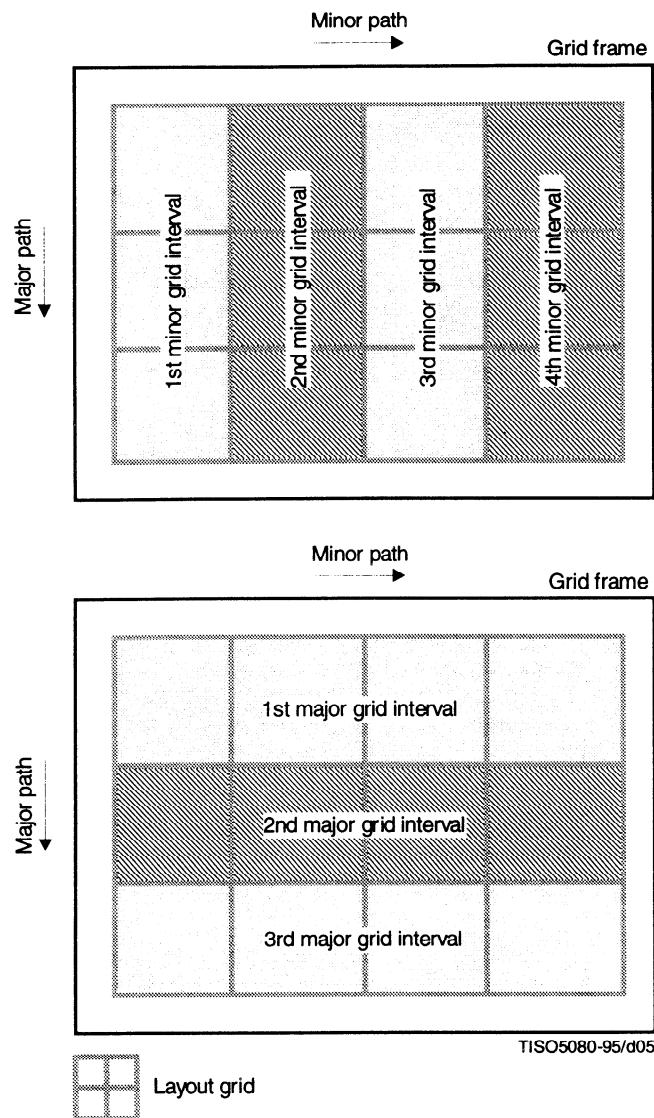


Figure 5 – Grid intervals

9.1.8 Dimensions of grid intervals

The term *grid interval dimension* denotes the distance between two consecutively numbered layout grid lines in the same direction.

If the layout grid lines are in the direction of the minor / major path, the grid interval dimension is called a *major / minor grid interval dimension*. In particular, the distance between the $(i - 1)$ -th and i -th major / minor layout grid lines is called the i -th major / minor grid interval dimension (see Figure 6).

The attribute “grid interval dimensions” applied to a grid frame specifies the dimensions of the grid intervals involved in the grid frame. Evaluation of the values of this attribute produces a set of interval indicators, each of which is to be applied to each individual grid interval.

If this attribute is specified in the class description for the grid frame, the interval indicator applied to each grid interval specifies a rule to determine the dimension of the grid interval. The layout process evaluates this interval indicator, and then determines the dimension of the grid interval.

In particular, the dimension of a grid interval may be determined to be 0, only if no content is laid out within this grid interval, and the interval indicator to be applied specifies one of the following (see 11.4):

- the parameter “fixed dimension” associated with the value 0;
- the parameter “rule B” with the minimum dimension 0;
- the parameter “proportional” with the default dimension 0.

If and only if the grid interval dimension is 0, then the two layout grid lines delimiting the grid interval are located at the same position.

If the attribute “grid interval dimensions” is specified in the object description for the grid frame, the interval indicator applied to each grid interval specifies the parameter “fixed dimension” associated with the dimension of the grid interval in scaled measurement units (see 12.1.4).

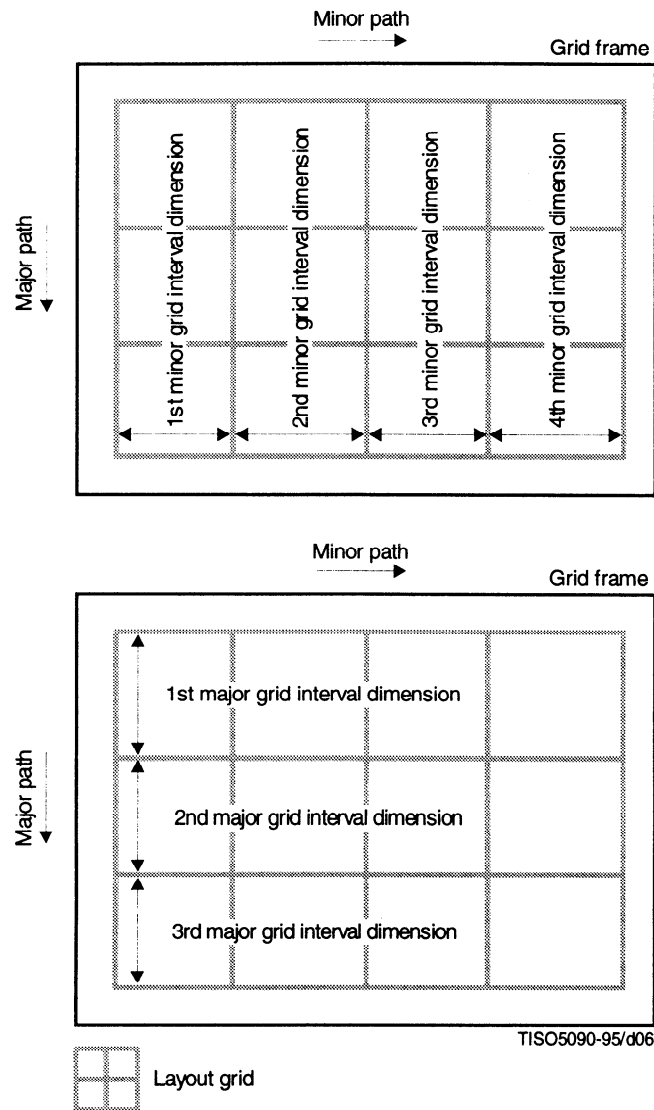


Figure 6 – Grid interval dimensions

9.1.9 Naming of edges of a layout grid rectangle

The *leading*, *trailing*, *left-hand* and *right-hand* edges of a layout grid rectangle are defined relative to the layout path of the grid frame (see Figure 7):

- The leading and trailing edges are defined as the two opposite edges of the rectangle that are orthogonal to the direction of the layout path, such that the direction from the trailing edge to the leading edge is in the same direction as the layout path.
- The left-hand and right-hand edges are defined as the two opposite edges of the rectangle that are parallel to the direction of the layout path, such that the direction from the right-hand edge to the left-hand edge is at an angle of 90° anti-clockwise relative to the direction of the layout path.

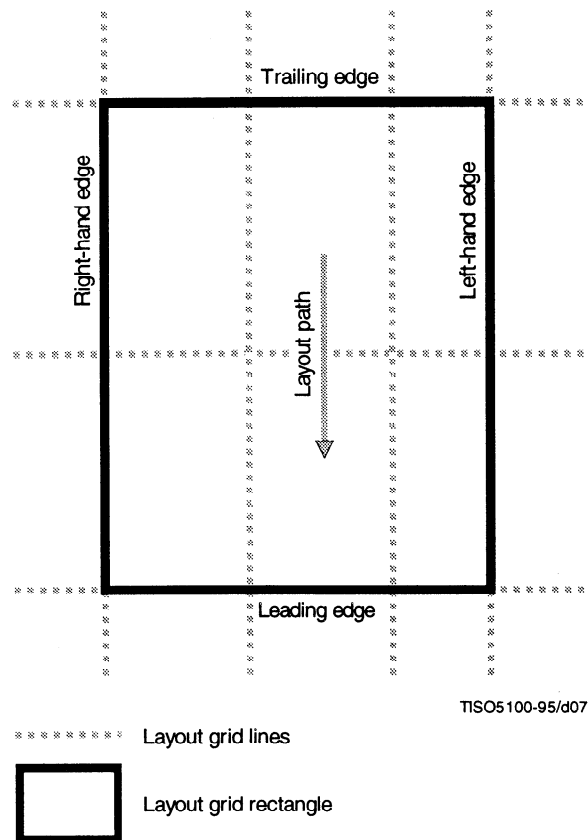


Figure 7 – Edges of grid rectangles

9.1.10 Grid gutter spaces

A *grid gutter space* around a layout grid line is a rectangular area within a layout grid, delimited by two lines running parallel to the layout grid line concerned, such that the layout grid line runs equidistant from these two edging lines. The *width of the grid gutter space* is defined as the distance between these two edging lines.

If a variably positioned frame is constrained to be laid out inside some layout grid rectangle within its immediately superior grid frame (see 9.3), the frame shall be excluded from the grid gutter spaces reserved around the four edges of the layout grid rectangle.

The attribute “grid gutters” applied to the grid frame specifies the widths of the grid gutter spaces around the layout grid lines within the grid frame (see 12.1.3).

9.1.11 Position of a layout grid

If the grid frame contains a layout grid, the layout grid is positioned within this grid frame so that it shall never fall within the border free space of the grid frame. The attribute “border” applied to the grid frame specifies the border free space to be taken into account in positioning the layout grid (see 9.4.1.3 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

The position of a layout grid within a grid frame is represented in one of the following ways:

- The distances in the direction of the major and minor paths, from the *grid reference point* of the grid frame, to the *grid origin* of the layout grid (see Figure 8) are specified; the grid reference point is one of the corners of the grid frame, while the grid origin is one of the corners of the layout grid; both the grid reference point and the grid origin are defined relative to the major and minor paths of the grid frame (see Table 2).
- The alignment of the layout grid in the directions of the major and minor paths is specified.

The attribute “grid position” applied to the grid frame specifies the position of the layout grid within the grid frame, in one of the above ways (see 12.1.6).

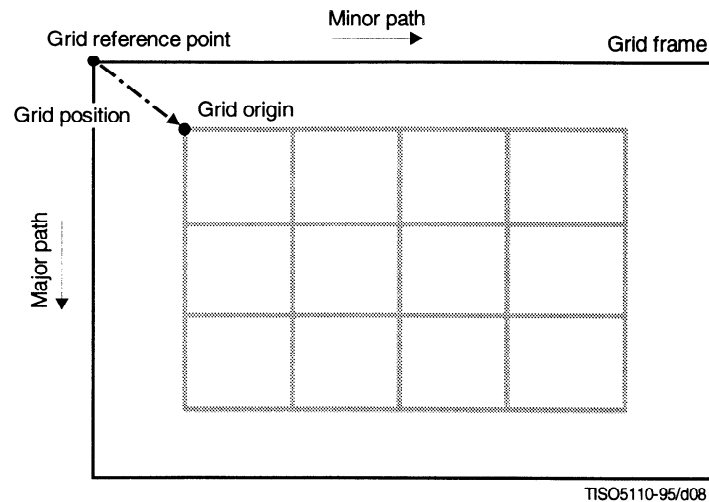


Figure 8 – Grid origin and grid reference point

9.1.12 Minimal layout of a layout grid

Determination of the grid interval dimensions involved in a layout grid provides a *minimal layout* of the layout grid, if and only if, for an arbitrary subset of the grid intervals of the layout grid, their determined dimensions cannot be reduced without increasing the determined dimensions for other grid intervals or violating the following constraints:

- constraints on the major and minor dimensions of the layout grid, imposed by the attribute “grid dimensions” (see 12.1.2);
- constraints on the major and minor interval dimensions of the layout grid, imposed by the attribute “grid interval dimensions” (see 12.1.4).

In general, there may be more than one instance of minimal layout for a single layout grid. The layout process shall generate one of those instances of the minimal layout for the layout grid.

9.2 Association of grid frames with grid logical objects

The attribute “grid frame classes” specifies a construction expression whose evaluation may produce a sequence of grid frame classes. If this attribute is applied to a grid logical object, a sequence of one or more grid frames shall be identified in the specific layout structure concerned (see 12.2.3).

A sequence of grid frames to be identified shall satisfy the following conditions:

- the order of grid frames given by the sequence coincides with their sequential layout order;
- the sequence of frame classes obtained by replacing every grid frame in the sequence with its frame class is one of the values that can be derived from evaluation of the construction expression specified for the attribute.

The content associated with the grid logical object shall be laid out entirely within the grid frames of this set. No other part of the document shall be laid out within any grid frame in this set (see 12.2.3).

If a grid frame is identified in accordance with the attribute “grid frame classes” applied to a grid logical object, the grid frame is called a *grid frame referred to* by the grid logical object.

9.3 Binding of entry frames to layout grid rectangles

Every grid frame referred to by a grid logical object contains a layout grid.

This layout grid includes the same number of major / minor grid lines as the logical grid associated with the grid logical object does. By means of ordinal numbers assigned to grid lines within the layout grid and the logical grid, the following correspondences between grid lines and between grid rectangles are defined.

9.3.1 Correspondence between layout grid lines and logical grid lines

The correspondence between the major / minor layout grid lines within the layout grid and the major / minor logical grid lines within the logical grid is such that:

- the i -th major / minor layout grid line corresponds to the i -th major / minor logical grid line, and vice versa.

9.3.2 Correspondence between layout grid rectangles and logical grid rectangles

The correspondence between the layout grid rectangles within the layout grid and the logical grid rectangles within the logical grid is such that:

- a layout grid rectangle corresponds to the logical grid rectangle whose four edging logical grid lines respectively correspond to the four layout grid lines edging the layout grid rectangle, and vice versa.

If a layout grid rectangle corresponds to a logical grid rectangle, the former rectangle is called the *layout counterpart* of the latter rectangle.

9.3.3 Layout of content associated with entry objects

The content associated with an entry object, which occupies a logical grid rectangle within the logical grid associated with its superior grid logical object, shall be laid out within frames immediately subordinate to those grid frames referred to by this grid logical object. Moreover, each of those frames shall be located inside the layout counterpart of the logical grid rectangle which the entry object occupies, no matter whether it is variably positioned, or has its position strictly fixed, within its immediately superior grid frames.

A frame to be variably positioned within the immediately superior grid frame is called an *entry frame*. If the content of an entry object is laid out within an entry frame, and therefore the entry frame is constrained to be laid out inside the layout counterpart of the logical grid rectangle which the entry frame occupies, the entry frame is said to be *bound to* that layout grid rectangle.

10 Duplication of content

If the attribute “obligatory same layout objects” is applied to a logical object, zero or more target objects shall be identified within the specific logical structure concerned (see 12.2.4). Target objects may be basic or composite. Further, in accordance with this attribute, the layout process may duplicate the content associated with the target objects, and thereafter may lay out the generated reproduction of the content.

10.1 Reproductions of content

Whenever the duplication of the content of a target object occurs, a reproduction of the entire content associated with this target object, which is complete except for the identification attributes, shall be generated.

10.1.1 Reproductions of the content of a basic logical object

A reproduction of the content associated with a single basic logical object is such that:

- the reproduction shall be a single content portion;
- this generated content portion shall be a reproduction of the unique content portion, called the *source content portion* or the *source* in short, which was originally associated with the basic logical object before the layout process; this reproduction is complete except that it includes neither of the content portion attributes “content identifier – logical” and “content identifier – layout”;
- this reproduction shall include the other content portion attributes “type of coding”, “content information”, “alternative representation”, as well as the coding attributes proper to the content architecture;
- the same value is assigned to each of these attributes as the value assigned to its counterpart attribute in the source content portion.

10.1.2 Reproductions of the content of a target object

When the target object is a basic logical object, one content portion shall be generated at each occurrence of the duplication of the content of the target object. This generated content portion shall be coincident with the reproduction of the content associated with the target object as defined in 10.1.1.

When the target object is a composite logical object, one content portion shall be generated for each basic logical object subordinate to the target object, at each occurrence of the duplication of the content of the target object. This content portion shall be a reproduction of the content associated with the basic logical object concerned. Hence, when the target object is superior to more than one basic logical object, the same number of content portions shall be generated. This set of content portions is collectively called a *reproduction of the content associated with the target object*.

10.1.3 Reproduction bundles

The duplication of content occurs only in accordance with the attribute “obligatory same layout objects” applied to some logical objects (see 12.2.4).

If the attribute “obligatory same layout objects” is applied to a logical object, a set of zero or more target objects shall be identified. If the duplication of content occurs in accordance with this instance of the attribute, one reproduction shall be generated for the content associated with each of those target objects, at each occurrence of the duplication.

The set of those reproductions, which are generated at a single occurrence of the duplication invoked by a single instance of the attribute “obligatory same layout objects”, is called a *reproduction bundle* generated in accordance with this instance of the attribute.

A single reproduction bundle satisfies that:

- for each basic logical object subordinate to each target object, the reproduction bundle contains one content portion that is a reproduction of the content associated with this basic logical object;
- the reproduction bundle is composed of only these content portions.

The duplication of content may occur whenever it is necessary. It may occur irrespective of the processing order of basic logical objects (see 12.2.5 and 13.5): the layout process may generate a reproduction of the content associated with a basic logical object, even if it has laid out the content associated with basic logical objects that follow it in the processing order.

NOTE – The processing order of basic logical objects is the order in which the layout process lays out basic logical objects. This order is the same as the sequential logical order, unless the attribute “presentation precedence” exists within the logical structure concerned. In that case, the attribute may affect this order (see 12.2.5 and 13.5).

The duplication of content may occur as many times as is necessary, even if it is in accordance with a single instance of the attribute “obligatory same layout object”.

10.2 Layout of content within reproductions

10.2.1 Order of layout

Whenever it becomes necessary for the layout process to duplicate content, the layout process suspends the layout of the relevant object until it completes the layout of the reproduction bundle generated at this occurrence of the duplication. The following steps are carried out:

- the layout process generates a bundle of reproductions, each of which is for the content associated with a single target object;
- the layout process lays out those content portions within the reproduction bundle one by one;
- the order in which the layout process lays out these content portions is the same as the processing order of the basic logical objects with which their source content portions are associated;
- the layout process starts again the layout of the relevant object.

10.2.2 Splits of content portions

The content portion in a reproduction of the content of a basic logical object may split into more than one content portions during the layout process, if the content portion are required to be laid out within more than one block (see also 6.5.2.5 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.2.3 Effects of layout directive attributes on layout

A reproduction may be laid out taking account of the layout directive attributes that have affected the layout of the source of the reproduction. This subclause provides descriptions of the way in which the layout directive attributes defined in ITU-T Rec. T.412 | ISO/IEC 8613-2 affect the layout of the content of reproductions. For the layout directive attributes introduced in this Specification, their effects on the layout of reproductions is described in clause 12.

The layout directive attributes defined in ITU-T Rec. T.412 | ISO/IEC 8613-2 are classified into two types:

- a) A layout directive attribute of the first type never refers to content other than that associated with the logical object to which it applies, and the effect of the attribute on the layout is confined to this content.

The attributes that belong to this type are the attributes “block alignment”, “fill order”, “offset”, “separation”, “layout category”, “logical stream category”, “layout stream sub-category”, “indivisibility”, “layout object class”, and “new layout object”.

- b) A layout directive attribute of the second type refers to content other than that associated with the logical object to which it applies. Such an attribute specifies that the content associated with that logical object shall be laid out related to the layout of the referenced content.

The attributes of this type are the attributes “concatenation”, “floatability range”, “same layout object”, and “synchronization”.

Principally, a layout directive attribute affects the layout of the content of a reproduction bundle as follows.

- a) When the layout directive attribute is of the first type, within the reproduction bundle, the content whose source content portions are associated with the logical object to which the attribute applies shall be laid out in accordance with this attribute. Moreover, the attribute shall independently affect the layout of each individual reproduction bundle.
- b) When the layout directive attribute is of the second type, the attribute affects the layout of the reproduction bundle if and only if the *affected content*, whose layout is to be affected by the attribute, and the *referenced content*, to which the layout of the affected content is to be related, are both included in the same reproduction. Otherwise, the attribute shall not affect the layout of the reproduction.

If the reproduction bundle includes both the affected content and the referenced content at the same time, the affected content shall be laid out related to the referenced content in accordance with the attribute. Moreover, in this case also, the attributes shall independently affect the layout of each individual reproduction of the content.

The following 10.2.3.1 to 10.2.3.10 provides descriptions of the effect of each attribute on the layout of the content of a reproduction of the content of a basic logical object, or a reproduction bundles.

10.2.3.1 “block alignment”, “fill order”, “offset”, “separation”

If any one of the attributes “block alignment”, “fill order”, “offset”, and “separation” applies to a basic logical object, and the reproduction is for the content associated with this basic logical object, then blocks that contain the content of this reproduction shall be laid out within their immediately superior frames as specified by the attribute (see also 9.7.2, 9.7.4, 9.7.12 and 9.7.14 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.2.3.2 “layout category”

If the attribute “layout category” applies to a basic logical object, and the reproduction is for the content associated with this basic logical object, then the content of this reproduction shall be constrained to be placed within lowest level frames such that their “permitted categories” include the layout category specified by the attribute (see 9.7.7 and 9.4.2.6 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.2.3.3 “logical stream category”, “logical stream sub-category”

If the attributes “logical stream category” and “logical stream sub-category” define a stream category that applies to a basic logical object, and the reproduction is for the content associated with this basic logical object, then the content of this reproduction is constrained to be placed within layout objects to which a stream category applies that is the same as that which applies to the basic logical object (see also 9.7.1.2, 9.7.9 and 9.7.10 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.2.3.4 “indivisibility”

If the attribute “indivisibility” applies to a logical object, then, within the reproduction bundle, the affected content is such that its source content portions are associated with this logical object.

The attribute specifies that the affected content shall be laid out within a single layout object that the attribute specifies. However, the attribute never constrains this layout object to contain any other particular content,

- even if it is associated with the logical object concerned;
- even if it belongs to another reproduction bundle whose source content portion is associated with the logical object concerned.

(See also 9.7.6 of ITU-T Rec. T.412 | ISO/IEC 8613-2.)

10.2.3.5 “layout object class”

If the attribute “layout object class” applies to a logical object, then, within the reproduction bundle, the affected content is such that its source content portions are associated with this logical object.

The attribute specifies that the affected content shall be laid out within a single layout object that the attribute specifies. Furthermore, no other content shall be laid out within this layout object,

- even if it is associated with the logical object concerned; or
- even if it belongs to another reproduction whose source content portions were associated with the logical object concerned.

(See also 9.7.8 of ITU-T Rec. T.412 | ISO/IEC 8613-2.)

10.2.3.6 “new layout object”

If the attribute “new layout object” applies to a logical object, and the reproduction is for the content associated with the first basic logical object subordinate to this logical object, then the content of this reproduction shall be laid out starting within the next layout object specified by the attribute which does not contain any prior content (see also 9.7.11 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

NOTE – In 10.2.3.8 and 10.2.3.9, the first “basic logical object” and the “last basic logical objects” are the first and last basic logical objects subordinate to the logical objects in the processing order of basic logical objects (see 12.2.5 and 13.5).

10.2.3.7 “concatenation”

If the attribute “concatenation” applies to a basic logical object with the value ‘concatenated’, then, within the reproduction bundle:

- a) the affected content is such that its source content portion is associated with the basic logical object to which the attribute applies;
- b) the referenced content is such that their source content portion is associated with the nearest preceding basic logical object which has the same content architecture class, layout category, stream category, and fill order.

The attribute specifies that this affected content and this referenced content shall be concatenated (see also 9.7.3 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

NOTE – In the above, “a preceding basic logical object” is one preceding the basic logical object in the processing order of basic logical objects (see 12.2.5 and 13.5). If the attribute “presentation precedence” exists within the specific logical structure concerned, this order may be different from the sequential logical order.

10.2.3.8 “floatability range”

If the attribute “floatability range” applies to a logical object, then, within the reproduction bundle:

- a) the affected content is such that its source content portions are associated with the logical object to which the attribute applies;
- b) one referenced content is such that their source content portions are associated with the logical objects that the sub-parameters “logical object” identifies of the parameter “forward limit”;
- c) the other referenced content is such that their source content portions are associated with the logical objects that the sub-parameters “logical object” identifies of the parameter “backward limit”;

The attribute specifies that this affected content shall be laid out between the former referenced content and the latter referenced content in the layout sequential order (see also 9.7.5 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.2.3.9 “same layout object”

If the attribute “same layout object” applies to a logical object, then within the reproduction bundle,

- a) the affected content is such that its source content portion is associated with the first basic logical object subordinate to the logical object to which the attribute applies;
- b) the referenced content is such that its source content portion is associated with the last basic logical object subordinate to the logical object that the parameter “logical object” of the attribute specifies.

The attribute specifies that the start of this affected content and the end of this referenced content shall be laid out within a single layout object which is of the layout object class or object type specified by the parameter “layout object” of the attribute (see also 9.7.13 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.2.3.10 “synchronization”

If the attribute “synchronization” applies to a logical object, then, within the reproduction bundle,

- a) the affected content is such that its source content portion is associated with the first basic logical object subordinate to the logical object to which the attribute applies;
- b) the referenced content is such that its source content portion is associated with the first basic logical object that the attribute specifies.

The attribute specifies that this affected content and this referenced content shall be laid out aligned along a line orthogonal to the direction of the layout path (see also 9.7.15 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

10.3 Content identifiers for reproductions

When the content portion of a reproduction of the content associated with a basic logical object is laid out within a block, the attribute “content identifier – layout” shall be assigned to the content portion. In contrast, the attribute “content identifier – logical” shall never be assigned throughout the layout process.

When the content portion is split into more than one content portion, and therefore it is laid out within more than one block, the attribute “content identifier – layout” shall be assigned to each split content portion. In this case also, the “content identifier – logical” shall never be assigned to any split content portion.

Hence, any content portion which stems from a content portion within a reproduction never includes the attribute “content identifier – logical”. In other words, such a content portion shall never be associated with any basic logical object (see 5.1).

This Specification abuses the term *reproduction* or the term *reproduction bundle*: even if content portions within a reproduction (bundle) are split into smaller content portions, the set consisting of these content portions may be also referred to as a reproduction (bundle).

11 Expressions

11.1 Grid construction expressions

Evaluation of a grid construction expression may produce either an empty sequence or a sequence of one or more *atoms*. Different types of grid construction expression deliver different types of atom.

A grid construction expression shall satisfy the following *deterministic condition*:

- if two sequences of atoms are derived from evaluation of a single grid construction expression, and they are of the same length, these sequences are coincident with each other.

NOTE – The length of a sequence of atoms is defined as the number of atoms composing the sequence. If the sequence is empty, its length is defined as 0.

There are four types of grid construction expressions, each of which delivers a different type of atom (see Table 1):

- grid interval expressions;
- grid gutter expressions;
- grid line expressions;
- line characteristic expressions.

A grid construction expression is either a grid construction term or a grid construction type. A grid construction type is one of the following:

- a grid sequence construction, which consists of one or more grid construction terms, which are to be evaluated in the order specified;
- a grid aggregate construction, which consists of one or more grid construction terms, which are to be evaluated in an arbitrary order;
- a grid choice construction, which consists of one or more grid construction terms, one of which is to be evaluated.

A grid construction term is one of the following:

- a grid required construction factor;
- a grid optional construction factor;
- a grid repetitive construction factor;
- a grid optional repetitive construction factor.

Each grid construction factor is either an atom or a grid construction type. In the former case, the value of the grid construction factor is the atom. In the latter case, the value of the grid construction factor is derived by evaluation of the grid construction type. Evaluation of the grid construction type may produce either an empty sequence or a sequence of one or more atoms:

- A grid required construction factor is to be evaluated once when the containing grid construction term is evaluated.
- A grid optional construction factor may be evaluated once or may not be evaluated, when the containing grid construction term is evaluated.
- A grid repetitive construction factor is to be evaluated one or more times in succession, when the containing grid construction term is evaluated.
- A grid optional repetitive construction factor may be evaluated one or more times in succession, or may not be evaluated, when the containing grid construction term is evaluated.

Table 1 – Types of grid construction expression

Type of expression	Attribute	Type of atom
Grid interval expression	“grid interval dimensions”	Interval indicator
Grid gutter expression	“grid gutters”	Gutter indicator
Grid line expression	“grid lines”	Line characteristic
Line characteristic expression	–	Line segment characteristic

11.2 Attributes with grid construction expressions as values

This Specification defines three attributes with parameters whose permissible value is a grid construction expression:

- a) grid interval dimensions (see 12.1.4);
- b) grid gutters (see 12.1.3);
- c) grid lines (see 12.1.5).

Each attributes is associated with a different type of grid construction expression (see Table 1):

- a) The permissible value for a parameter of the attribute “grid interval dimensions” is a grid interval expression (see 11.3). The layout process evaluates this attribute specified for a grid frame class description, and determines the grid interval dimensions of the layout grid within the grid frame to which this attribute applies. The determined grid intervals are expressed as a grid interval expression, and then the expression is specified for the grid frame description as a value for the same attribute.

The imaging process evaluates the attribute “grid interval dimensions” specified for a grid frame description, and gets the positions where it shall image the layout grid lines involved in its layout grid.

- b) The permissible value for a parameter of the attribute “grid gutters” is a grid gutter expression (see 11.5). The layout process evaluates this attribute, and calculates available areas for frames immediately subordinate to the grid frame to which the attribute applies.
- c) The permissible value for a parameter of the attribute “grid lines” is a grid line expression (see 11.7). The layout process evaluates this attribute specified for a grid frame class description, and determines the way in which the imaging process shall image the layout grid lines within the grid frame to which this attribute applies. This way of presenting the layout grid lines is expressed as a grid line expression, and then the expression is specified for the grid frame description as a value of the same attribute.

The imaging process evaluates the attribute “grid lines”, and images layout grid lines of the layout grid within the grid frame.

11.3 Grid interval expressions

The value of a *grid interval expression* is an *interval indicator* (see 11.4). A grid interval expression may be a value of a parameter of the attribute “grid interval dimensions”.

The attribute “grid interval dimensions” specifies the distances or a rule to determine distances between consecutively numbered major / minor layout grid lines (called the *major / minor grid interval dimension*). This attribute consists of two parameters “major interval dimensions” and “minor interval dimensions”, which respectively specify the dimensions of the major and minor grid intervals of the layout grid within the grid frame to which the attribute is applied.

Evaluation of a grid interval expression specified for the parameter “major / minor interval dimensions” may produce either an empty sequence or a sequence of interval indicators. The length of the derived sequence shall be the same as the major / minor grid size of the layout grid, namely the number of the major / minor grid intervals within the layout grid. Each interval indicator in the sequence specifies the dimension of an individual grid interval: the *i*-th interval indicator in the sequence specifies the *i*-th major / minor grid interval dimension of the layout grid, namely the distance between (*i* – 1)-th and *i*-th major / minor layout grid lines.

NOTE – The deterministic condition of the grid construction expression provides for the unique sequence of interval indicators for the given major / minor size of the layout grid.

Whenever the layout process reaches a grid logical object, the process evaluates the attribute “grid frame classes”, if it exists, applied to the grid logical object, and generates one or more grid frames in accordance with the construction expression specified for the attribute. At the same time, the process shall generate a layout grid within each generated grid frame so that this layout grid shall include as many major / minor grid intervals as the logical grid associated with the grid logical object does (see 9.2). Thus, the major and minor sizes of the layout grid are derived from those of the associated logical grid.

11.4 Interval indicators

Constituents:

Terminal factors for grid interval expressions.

Structure:

One of the parameters “fixed dimension”, “rule B” or “proportional”.

The parameter “rule B” is structured into two optional sub-parameters, “minimum dimension” and “maximum dimension”.

The parameter “proportional” is structured into three optional sub-parameters, “group”, “imaginary dimension” and “default dimension”.

Permissible values:

For the parameter “fixed dimension”: a non-negative integer.

For the sub-parameters of the parameter “rule B”:

- “minimum dimension”: a non-negative integer;
- “maximum dimension”: either a non-negative integer or ‘infinitely large’.

For the sub-parameters of the parameter “proportional”:

- “group”: a non-negative integer;
- “imaginary dimension”: a non-negative integer;
- “default dimension”: either a non-negative integer or ‘null’.

Default values:

For the sub-parameters of the parameter “rule B”:

- “minimum dimension”: 0;
- “maximum dimension”: ‘infinitely large’.

For the sub-parameters of the parameter “proportional”:

- “group”: 0;
- “imaginary dimension”: 1;
- “default dimension”: ‘null’.

Definition:

An interval indicator is one of the following:

- a) *The parameter “fixed dimension”*

The parameter “fixed dimension” specifies that the dimension of the relevant grid interval to which this interval indicator applies shall be the value specified for this parameter, measured in scaled measurement units (SMU).

- b) *The parameter “rule B”*

The parameter “rule B” specifies that the dimension of the relevant grid interval shall be determined so that:

- the interval dimension shall be within the range between the value specified for the sub-parameters “minimum dimension” and “maximum dimension”;
- the interval dimension shall be large enough for the immediately subordinate entry frames which intersect the grid interval.

The detailed definitions for the sub-parameters “minimum dimension” and “maximum dimension” are as follows:

- The sub-parameter “minimum dimension” specifies the lower limit for the relevant grid interval dimension. The grid interval dimension shall not be smaller than this lower limit.
- The sub-parameter “maximum dimension” specifies an upper limit for the relevant grid interval dimension. The grid interval dimension shall not exceed this upper limit.

If the parameter maximum dimension specifies the value ‘infinitely large’, then there shall be no upper limit for the grid interval dimension.

In addition to these constraints, the interval dimension is subject to constraints on the grid dimensions of the relevant layout grid. Such constraints are specified by the attribute “grid dimensions” applied to the grid frame (see 12.1.2):

- 1) If the parameter “major / minor dimension” of this attribute specifies a non-negative integer, the major / minor dimension of this layout grid shall be the specified value.
- 2) If the parameter “major / minor dimension” of this attribute specifies the value ‘expansive’, the major / minor dimension of this layout grid shall be the same as the dimension of the area available for the placement of the layout grid in the direction of the major / minor path.

In both cases, where the attribute “grid dimensions” specifies some fixed value for the grid dimension in the same direction as that of the relevant grid interval, the dimension of this grid interval may take an arbitrary value, provided that:

- the total amount of all the grid interval dimensions in the relevant direction is constrained to be this fixed value;
- each grid interval dimension in the relevant direction satisfies the constraints imposed by the interval indicator applied to it.

- 3) If the parameter “major / minor dimension” of this attribute specifies the value ‘rule B’, there exists no constraint on the major / minor grid dimension except for those imposed by the area available for the relevant layout grid.

In this case, the interval dimension shall be a *minimal dimension*. Minimal dimensions for the grid intervals entirely provide an instance of minimal layout of the layout grid. For the details of the minimal layout, refer to 9.1.12.

c) *The parameter “proportional”*

The parameter “proportional” specifies that the relevant grid interval dimension to which this interval indicator applies shall be determined so that:

- the interval dimension shall be in specified proportions to other particular grid interval dimensions;
- the interval dimension shall be large enough for the immediately subordinate entry frame intersecting the grid interval concerned.

The definition of the sub-parameters are as follows:

- The sub-parameter “group” specifies the group of grid intervals whose dimensions are to be determined in proportion to the relevant grid interval dimension.

Within the layout grid, this group consists of those grid intervals such that:

- they are all in the same direction;
- all the interval indicators that apply to them commonly specify the parameter “proportional”;
- these interval indicators specify the same value for the sub-parameter “group” as the relevant interval indicator does.
- The sub-parameter “imaginary dimension” specifies the dimension of the grid interval measured in a particular imaginary measurement unit. This imaginary measurement unit is shared by all the grid intervals that belong to the same group.
The layout process shall independently determine the actual dimension for the imaginary measurement unit proper to each individual group of grid intervals. This actual dimension shall be measured in scaled measurement units. Thereafter, the layout process shall determine the dimension of each grid interval that belongs to the group concerned so that:
 - the dimension shall be the product of the determined dimension of the relevant imaginary measurement unit and the value specified for the sub-parameter “imaginary dimension” of the interval indicator applied to this grid interval.
- The sub-parameter “default dimension” specifies the default dimension which the grid interval shall take when no entry frame intersects it.

If this parameter specifies a value of a non-negative integer, the grid interval dimension shall be this specified value, measured in scaled measurement units, irrespective of the dimensions of the other grid intervals in the same group.

If this parameter specifies the value ‘null’, the dimension of the grid interval shall be always determined so as to keep the specified proportions to the dimensions of the other grid intervals in the same group, no matter whether any entry frames intersect it.

In addition to these constraints, the actual dimension of the imaginary measurement unit shall be subject to the constraints imposed by the attribute “grid dimensions”, in the same way as stated in the case of the value “rule B”.

11.5 Grid gutter expressions

The value of a *grid gutter expression* is a *gutter indicators*. A grid gutter expression may be a value of a parameter of the attribute “grid gutters”.

The attribute “grid gutters” specifies the gutter space width around major and minor grid lines within the grid frame to which the attribute is applied. The attribute consists of two parameters “around major grid lines” and “around minor grid lines” which respectively specify the gutter space width around major and minor layout grid lines.

Evaluation of a grid gutter expression specified for the parameter “around major / minor grid lines” may produce either an empty sequence or a sequence of gutter indicators. The length of the derived sequence is the same as the number of the major / minor layout grid lines within the layout grid concerned.

Each gutter indicator in the sequence specifies the gutter space width around an individual layout grid line: the *i*-th gutter indicator in the sequence specifies the gutter space width around the *i*-th major / minor grid line.

11.6 Gutter indicators

Constituents:

Terminal factors for grid gutter expressions.

Structure:

Consists of two optional parameters: “width”, “precedence”.

Permissible values:

- “width”: a non-negative integer (SMU);
- “precedence”: a non-negative integer.

Default values:

- “width”: 0;
- “precedence”: 0.

Definition:

A gutter indicator consists of two optional parameters:

- The parameter “width” specifies the gutter space width around the layout grid line to which the gutter indicator is applied. The width is measured in scaled measurement units.
- If two or more layout grid lines occupy the same position within the grid frame, the same number of gutter indicators are applicable in determining the gutter space width around the line into which those layout grid lines merge. In such degenerate cases, the layout process takes account of the parameter “precedence” associated with those gutter indicators:
 - a) among those gutter indicators applicable, the one having the highest “precedence” shall be applied;
 - b) if two or more gutter indicators are associated with the highest “precedence”, the last in the sequential order shall be applied.

11.7 Grid line expressions

A *grid line expressions* is a *line characteristics*.

A grid line expression may be a value of the parameters “major grid lines” and “minor grid lines” of the attribute “grid lines”. The parameter “major / minor grid lines” specifies a set of sequences of line segment characteristics each of which describes the way in which each individual major / minor grid line is to be imaged.

A line segment characteristic is a triplet of a line width, line type and line colour, and is applied to an individual grid line segment (see 9.1.4) forming part of a layout grid line. Thus, when a layout grid line is imaged, it may be a sequence of line segments each of which may be imaged in a different way.

Direct evaluation of a grid line expression specified for the parameter “major / minor grid lines” may produce a sequence of one or more line characteristics. The length of the derived sequence is the same as the number of the major / minor layout grid lines within the layout grid. Each line characteristic in the sequence is applied to an individual layout grid line: the *i*-th line characteristic in the sequence is applied to the *i*-th major / minor layout grid line.

11.8 Line characteristics

Constituents:

Terminal factors for grid line expressions.

Structure:

Consists of two optional parameters: “expression” and “precedence”.

Permissible values:

- “expression”: a line characteristic expression;
- “precedence”: a non-negative integer.

Default value:

- “expression”: the grid optional repetitive construction factor which is the default line segment characteristic (see 11.10);
- “precedence”: 0.

Definition:

A line characteristic consists of two optional parameters:

- The parameter “expression” takes as its value a line characteristic expression, and the effect is as described in 11.9.
- If two or more layout grid lines merge into a single line, that same number of line characteristics are applicable to the single line into which those layout grid lines merge. In such degenerate cases, the layout process takes the parameter “precedence” associated with those line characteristics into account:
 - a) among the line characteristics applicable, the one having the highest “precedence” shall be applied;
 - b) if two or more line characteristics are associated with the highest “precedence”, the last in the sequential order shall be applied.

11.9 Line characteristic expressions

A line characteristic expressions is a line segment characteristics.

Evaluation of a grid line expression may produce either an empty sequence or a sequence of line characteristics each of which includes one line characteristic expression. Each line characteristic expression in the sequence is applied to an individual major / minor layout grid line in order to determine the way in which it is to be imaged.

Evaluation of a line characteristic expression produces a sequence of one or more line segment characteristics. The length of the derived sequence is the same as the number of the *grid line segments* composing the layout grid line.

Consecutively numbered minor / major layout grid lines may merge into a single line, and therefore the line segment delimited by these grid lines may degenerate into a point. In such cases, the point shall be counted as a line segment. Hence, the number of the line segment composing a layout grid line is the same as the number of the minor / major sizes of the layout grid concerned.

Each line segment characteristic in the sequence specifies the line width, line type and line colour of an individual grid line segment of the layout grid line to which the line characteristic expression is applied: the j -th line segment characteristic in the sequence specifies the line width, line type and line colour of the j -th line segment of the major / minor layout grid line, where the j -th line segment of the layout grid line is between the $(j - 1)$ -th and j -th minor / major layout grid lines.

11.10 Line segment characteristics

Constituents:

Terminal factors for line characteristic expressions.

Structure:

Consists of three optional parameters: “line width”, “line type”, “line colour”.

The parameter “line colour”, if specified, is a choice between two sub-parameters: “implementation defined” and “colour expression”. The sub-parameter “implementation defined” is not substructured. The sub-parameter “colour expression” is structured as defined for the colour expressions in 9.1.4.1 of ITU-T Rec. T.412 | ISO/IEC 8613-2.

Permissible values:

- “line width”: a non-negative integer (SMU);
- “line type”: one of ‘solid’, ‘dashed’, ‘dash-dot’, ‘dash-dot-dot’, ‘double’ and ‘invisible’;
- “line colour”:
 - “implementation defined”: ‘implementation-defined’;
 - “colour expression”: a colour expression as defined in 9.1.4.1 of ITU-T Rec. T.412 | ISO/IEC 8613-2.

Default value:

Each of the parameters is independently defaultable.

For the parameters “line width” and “line type”:

- “line width”: 0;
- “line type”: ‘solid’.

For the parameter “line colour”, the default value is the sub-parameter “colour expression” with the sub-sub-parameters:

- “colour access mode”: ‘direct’;
- “colour space id”: 0;
- “colour specification”: 1, 1, 1;
- “colour tolerance”:
 - “unspecified tolerance”: ‘infinite’.

NOTE – The default value for a colour expression is a white colour in RGB space without limit on tolerance.

Definition:

A line segment characteristic is applied to either a grid line segment of a layout grid line or a supplementary line, and determines its line width, line type and line colour.

The parameter “line colour” specifies the line colour. It either has the value ‘implementation-defined’ (a value that is distinguishable from the colour visible in the layout object) or is given in terms of a colour expression as defined in 9.1.4.1 of ITU-T Rec. T.412 | ISO/IEC 8613-2. In the case of an indexed colour expression the relevant colour table is specified in the attribute “object colour table” applied to the grid frame that includes the grid line segment or the supplementary line.

12 Attribute definitions

12.1 Layout attributes

12.1.1 Frame alignment point

Constituents:

Frame component descriptions.

Classification:

Non-mandatory for object class descriptions.

Defaultable for object descriptions.

Structure:

One of the parameters: “subordinate dependent”, “fixed position”, “variable position”.

The parameter “fixed position” is structured into two optional sub-parameters: “vertical position”, “horizontal position”.

The parameter “variable position” is structured into two optional sub-parameters: “vertical alignment”, “horizontal alignment”.

Permissible values:

For the parameter “subordinate dependent”: ‘first’, ‘last’.

For the parameter “fixed position”:

- “vertical position”: any integer;
- “horizontal position”: any integer.

For the parameter “variable position”:

- “vertical alignment”: ‘top’, ‘centre’, ‘bottom’;
- “horizontal alignment”: ‘left’, ‘centre’, ‘right’.

Default value:

If no value is specified, the default value is the parameter “subordinate dependent” with the value ‘first’.

Definition:

12.1.1.1 The layout process shall take this attribute into account only when applied to a frame subordinate to some grid frame.

This attribute specifies the position of the alignment point associated with the relevant frame to which the attribute applies.

12.1.1.2 The parameter “subordinate dependent” specifies that the alignment point of the relevant frame shall be located on the alignment point associated with one of the immediately subordinate layout objects, no matter whether it is a frame or a block:

- if the parameter specifies the value ‘first’, then the alignment point of the relevant frame shall occupy the same position as the alignment point of the first immediately subordinate layout object in the sequential layout order;
- if the parameter specifies the value ‘last’, then the alignment point of the relevant frame shall occupy the same position as the alignment point of the last immediately subordinate layout object in the sequential layout order.

12.1.1.3 When the attribute specifies the parameter “fixed position”, the sub-parameter “vertical / horizontal position” specifies the vertical / horizontal distance of the alignment point from the reference point of the relevant frame, measured in scaled measurement units.

The vertical position is measured in the top-to-bottom direction:

- If the sub-parameter “vertical position” specifies a positive / negative integer, the alignment point shall be located beneath / above the reference point.

The horizontal position is measured in the left-to-right direction:

- If the sub-parameter “horizontal position” specifies a positive / negative integer, the alignment point shall be located on the right / left of the reference point.

An alignment point specified by the parameter “fixed position” may fall outside the relevant frame.

If this parameter does not specify a value for any of its sub-parameters, then the value zero is assumed for each sub-parameter for which a value is not specified.

12.1.1.4 If the attribute specifies the parameter “variable position”, the sub-parameter “vertical / horizontal alignment” specifies the vertical / horizontal position of the alignment point:

- If the sub-parameter “vertical alignment” specifies the value ‘top’ / ‘bottom’, then the alignment point shall be located on the top / bottom edge of the relevant frame.
If the sub-parameter specifies the value ‘centre’, then the alignment point shall be located equidistant from the top and bottom edges of the relevant frame.
- If the sub-parameter “horizontal alignment” specifies ‘left’ / ‘right’, then the alignment point shall be located on the left / right edge of the relevant frame.
If the sub-parameter specifies the value ‘centre’, then the alignment point shall be located equidistant from the right and left edges of the relevant frame.

NOTE – The left / right edge of the frame may be different from the left-hand / right-hand edge. The former is defined absolutely, while the latter is defined relative to the layout path (see 7.3.3 of ITU-T Rec. T.412 | ISO/IEC 8613-2).

An alignment point specified by the parameter “variable position” is always located within the relevant frame.

If this parameter does not specify a value for any of the sub-parameters, then the value ‘centre’ is assumed for each sub-parameter for which a value is not specified.

12.1.2 Grid dimensions

Constituents:

Grid frame component descriptions.

Classification:

Non-mandatory for object class descriptions.

Defaultable for object descriptions.

Structure:

Consists of two optional parameters: “major dimension” and “minor dimension”.

Permissible values:

For each parameter: one of a non-negative integer (SMU), ‘rule B’, ‘expansive’.

Default value:

Each of the parameters is independently defaultable.

For each parameter: ‘rule B’.

Definition:

12.1.2.1 The layout process shall take this attribute into account only when the relevant grid frame to which this attribute applies is referred to by an instance of the attribute “grid frame classes” which applies to some grid logical object (see 12.2.3).

This attribute specifies the dimensions of the edges of the layout grid within the relevant grid frame.

The parameter “major / minor dimension” specifies the dimension of the edges parallel to the major / minor path of the grid frame. This dimension is equal to the distance between the 0-th and last major / minor layout grid lines.

12.1.2.2 If the parameter “major / minor dimension” specifies a non-negative integer, the dimension of the edges shall be the value specified by this parameter.

12.1.2.3 If the parameter “major / minor dimension” specifies the value ‘rule B’, the dimension of the edges shall be determined in accordance with the attribute “grid interval dimensions” applied to the same grid frame. The attribute “grid interval dimensions” specifies the major / minor grid interval dimensions, namely the distances between consecutively numbered major / minor layout grid lines within the grid frame. Therefore, the dimension of the edges parallel to the major / minor path shall be coincident with the total of all the major / minor grid interval dimensions.

12.1.2.4 If the parameter “major / minor dimension” specifies the value ‘expansive’, the layout grid shall expand to the available area within the relevant grid frame, in the direction of the major / minor path.

12.1.2.5 No matter which value is specified for this attribute, the grid shall be placed within the relevant grid frame. In addition, if the relevant grid frame has a border free space, the grid shall not fall within the border free space.

12.1.3 Grid gutters

Constituents:

Grid frame component descriptions.

Classification:

Non-mandatory for object class descriptions.

Defaultable for object descriptions.

Structure:

Consists of two optional parameters: “around major grid lines” and “around minor grid lines”.

Permissible values:

For each parameter: a grid gutter expression.

Default value:

Each of the parameters is independently defaultable.

For each parameter: the grid optional repetitive construction factor which is the default gutter indicator.

For the parameters of the default gutter indicator:

- “width”: 0;
- “precedence”: 0.

Definition:

12.1.3.1 The layout process shall take this attribute into account only when the relevant grid frame to which this attribute applies is referred to by an instance of the attribute “grid frame classes” which applies to some grid logical object (see 12.2.3).

This attribute consists of two parameters: “around major grid lines” and “around minor grid lines”. The parameter “around major / minor grid lines” specifies the gutter space width around the major / minor grid lines within the relevant grid frame to which this attribute is applied.

A gutter space around a layout grid line is a rectangular area within the layout grid, delimited by two lines running parallel to the layout grid line concerned, such that the layout grid line is equidistant from those two edging lines. The width of the gutter space is defined as the distance between those two edging lines (see Figure 9).

The layout process shall take gutter spaces into account in determining the area available for placement of an entry frame: if an entry frame is bound to a layout grid rectangle, the entry frame shall be excluded from the gutter spaces reserved around the four edges of the grid rectangle.

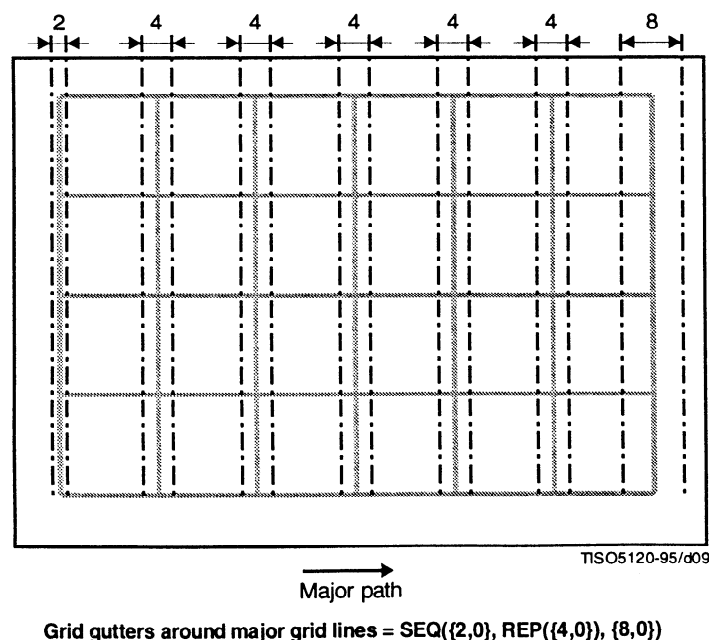


Figure 9 – Gutter spaces

12.1.3.2 The parameter “around major / minor grid lines” specifies the grid gutter space width around the major / minor layout grid lines.

Evaluation of the grid gutter expression specified for the parameter “around major / minor grid lines” shall produce a sequence of one or more gutter indicators. The number of gutter indicators in this derived sequence shall be the same as the number of the major / minor layout grid lines within the grid frame (see 11.5): the *i*-th gutter indicator in the sequence specifies the gutter space width around the *i*-th major / minor layout grid line.

Each gutter indicator consists of two optional parameters: “width” and “precedence”. For the definition of these parameters, refer to 11.6.

12.1.4 Grid interval dimensions

Constituents:

Grid frame component descriptions.

Classification:

Non-mandatory.

Structure:

Consists of two parameters: “major interval dimensions” and “minor interval dimensions”.

Permissible values:

For each parameter: a grid interval expression.

Definition:

NOTE – In this definition, the scope of the symbol / is the entire text (see 5.2).

12.1.4.1 The layout process shall take this attribute into account only when the relevant grid frame to which this attribute applies is referred to by an instance of the attribute “grid frame classes” which applies to some grid logical object (see 12.2.3).

This attribute consists of two parameters: “major interval dimensions” and “minor interval dimensions”. The parameter “major / minor interval dimensions” specifies the dimensions of major / minor grid intervals. The dimension of a major / minor grid interval, called also a *major / minor grid interval dimension*, is the distance between two consecutively numbered major / minor layout grid lines.

12.1.4.2 If an object class description specifies this attribute, arbitrary grid interval expressions may be specified for the parameters.

In contrast, if an object description specifies this attribute, the grid interval expression specified for the parameter “major / minor grid interval” shall be of the grid sequence construction type composed of interval indicators. Furthermore:

- each interval indicator involved in this grid interval expression shall specify the parameter “fixed dimension” (see 11.4);
- the number of the interval indicators involved in this grid interval expression shall be the same as the major / minor grid size of the relevant layout grid.

By evaluating this attribute specified for the object description, the imaging process shall determine the absolute dimensions of the grid intervals as well as the grid sizes of the layout grid (see 9.1.5). If the attribute is omitted from the object description, the imaging process shall regard the grid frame as an ordinary frame which does not include any layout grid.

12.1.4.3 Evaluation of the grid interval expression specified for the parameter “major / minor interval dimensions” shall produce a sequence of one or more interval indicators (see 11.3). The number of interval indicators involved in the derived sequence shall be the same as the major / minor size of the layout grid within the relevant grid frame.