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

Part 10: Formal specifications

AMENDMENT 3: Formal specification of the character content architectures

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

Partie 10: Spécifications formelles

*AMENDEMENT 3: Spécifications formelles des architectures de contenus
de caractères*



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Foreword

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Amendment 3 to International Standard ISO/IEC 8613-10:1991 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 8613 consists of the following parts, under the general title *Information processing – Text and office systems – Office Document Architecture (ODA) and interchange format* :

- *Part 1: Introduction and general principles*
- *Part 2: Document structures*
- *Part 4: Document profile*
- *Part 5: Office Document Interchange Format (ODIF)*
- *Part 6: Character content architectures*
- *Part 7: Raster graphics content architectures*
- *Part 8: Geometric graphics content architectures*
- *Part 10: Formal specifications*

Annex C forms an integral part of ISO/IEC 8613-10.

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

Part 10:
Formal specifications

**AMENDMENT 3: Formal specification of the character
content architectures**

Insert a new annex C as follows:

Annex C

(normative)

Formal specification of the character content architectures

C.1 Introduction

This annex gives a formal specification of the character content architectures as described in ISO 8613-6. This annex is composed of 6 clauses:

Clause C.1 provides a general introduction, including a list of all definitions which are given in C.2, C.3, C.4 and C.5.

Clause C.2 provides the interface to the document profile - by giving a formal specification of those attributes which may be included in the document profile attribute 'document application profile defaults'.

Clauses C.3 and C.4 provide the interface to the document architecture by giving a formal specification of character content portion presentation attributes; and any associated content portion attributes applicable to the character content portions.

Clause C.5 provides a description of the elements of the character content information. In particular, the following general rules on the syntactic and semantic usage of control functions are formally specified:

1. GCC-0 shall be followed by 2 or more graphic characters (see ISO 8613-6, clause 11.1.2).
NOTE: ISO 8613-6, clause 11.1.2 states implicitly that 2 or more graphic characters can follow a GCC-0 but only the 2 *graphic characters* immediately following the GCC-0 are concatenated (if they are not split by a line break which would introduce control function characters).
2. GCC-1 shall be followed by 2 or more graphic characters followed by GCC-2 (see ISO 8613-6, clause 11.1.2).
NOTE: ISO 8613-6, clause 11.1.2 states implicitly that at least 2, but possibly more, graphic characters can follow a GCC-1 but only the *graphic characters* immediately following the GCC-1 and which are terminated by a GCC-2 are concatenated (if they are not split by a line break which would introduce control function characters).
3. LF is only permitted: (a) at the beginning of a character string, (b) after a CR and (c) after a LF (see ISO 8613-6, clause 11.1.4).
4. The number of PLUs shall be complemented exactly by PLDs before any LF is encountered and at any position in the string the following condition is applicable; $|\#PLU - \#PLD| \leq 1$ (see ISO 8613-6, clauses 11.1.5 and 11.1.6).
NOTE: For rules 4. and 6., the # means *number of*. For rule 4. the $|x - y|$ represents the mathematical modulus.
5. SRS-1 shall be followed by one or more characters except CR LF and followed by SRS-0 (see ISO 8613-6, clause 11.1.11).
6. The $\#PLU = \#PLD$ between SRS-1 and SRS-0 (see ISO 8613-6, clause 11.1.11).
7. The effects of VPB and VPR shall be cancelled (see 8. for details). within any SRS-1 and SRS-0 (see ISO 8613-6, clause 11.1.11).
8. The effects of all VPB- n_i s and VPR- m_j s shall be cancelled (i.e., $\sum_{i=1}^p VPB-n_i = \sum_{j=1}^q VPR-m_j$ where $\{i, j, p, q, n_i, m_j \in \mathbb{N}\}$) before the control functions CR LF are encountered (see ISO 8613-6, clauses 11.1.15 and 11.1.16).
9. PTX-1 shall be followed by a character string which shall be followed by PTX-3 followed by a character string followed by PTX-0 (see ISO 8613-6, clause 11.3.3).

10. SOS is followed by a character string followed by ST (NOTE: Nesting is not forbidden). (See ISO 8613-6, clause 11.4.2).

Clause C.6 is an index to the terms (definitions, operators, attribute names) used in clauses C.2, C.3, C.4 and C.5.

Any time a clause number is specified in the semi-formal descriptions this refers to a clause number in ISO 8613-6.

What follows is the outline of the formula which specifies the character content architectures. The dots indicate formal text fragments which have been left out for the sake of readability. The full formula can be obtained by replacing each line (apart from the *and*) with the definition which is referenced by the superscript of the predicate symbol or operator symbol, respectively. The variables used in the definition of the predicate have to be replaced by those appearing in the outline (if they are different).

NOTE: A definition is a formula, hence it may never yield an undefined result, whatever value has been inserted for the variable.

... IsProfileDefaultableCharacterContentArchitectureAttribute^{6.1}(*att*) ...

and ... IsProfileCharacterCodingSpecification^{6.2}(*v*) ...

and ... IsProfileCharacterPresentationFeature^{6.3}(*v*) ...

and ... SatisfiesCharacterContentArchitectureConstraints^{6.4}(*prof, doby*) ...

and ... IsProcessableCharacterDescription^{6.5}(*cont*) ...

and ... IsProcessableCharacterContent^{6.6}(*cont*) ...

and ... IsFormattedCharacterDescription^{6.7}(*cont*) ...

and ... IsFormattedCharacterContent^{6.8}(*cont*) ...

and ... IsFormattedProcessableCharacterDescription^{6.9}(*cont*) ...

and ... IsFormattedProcessableCharacterContent^{6.10}(*cont*) ...

and ... IsCharacterContentPortionDescription^{6.11}(*cont*) ...

and ... IsCharacterContentPresentationAttribute^{6.12}(*att*) ...

and ... IsCharacterContentCodingAttribute^{6.13}(*att*) ...

and ... IsCharacterContentPortionAttributeSet^{6.14}(*as*) ...

and ... IsAlignmentValue^{6.15}(*v*) ...

and ... IsCharacterFontsValue^{6.16}(*v*) ...

and ... IsCharacterOrientationValue^{6.17}(*v*) ...

and ... IsFormattingIndicatorValue^{6.18}(*v*) ...

and ... IsCharacterPathValue^{6.19}(*v*) ...

and ... IsCharacterContentTypeOfCodingValue^{6.20}(*v*) ...

and ... IsCharacterSpacingValue^{6.21}(*v*) ...

and ... IsFirstLineOffsetValue^{6.22}(*v*) ...

and ... IsCharacterSetsValue^{6.23}(*v*) ...

and ... IsGraphicCharacterSubrepertoireValue^{6.24}(*v*) ...

and ... IsISO6937SubrepertoireId^{6.25}(*v*) ...

and ... IsCharacterContentArchitectureClassValue^{6.26}(*v*) ...

and ... IsGraphicRenditionValue^{6.27}(*v*) ...

and ... IsWeightValue^{6.28}(*v*) ...

and ... IsPostureValue^{6.29}(*v*) ...

and ... IsUnderliningValue^{6.30}(*v*) ...

and ... IsBlinkingValue^{6.31}(*v*) ...

and ... IsImageInversionValue^{6.32}(*v*) ...

and ... IsCrossingOutValue^{6.33}(*v*) ...

and ... IsIndentationValue^{6.34}(*v*) ...

and ... IsCharacterInitialOffsetValue^{6.35}(*v*) ...

and ... IsKerningOffsetValue^{6.36}(*v*) ...

and ... IsOrphanSizeValue^{6.37}(*v*) ...

and ... IsCodeExtensionAnnouncersValue^{6.38}(*v*) ...

and ... IsPairwiseKerningValue^{6.39}(*v*) ...

and ... IsWidowSizeValue^{6.40}(*v*) ...

and ... IsProportionalLineSpacingValue^{6.41}(*v*) ...

and ... IsLineLayoutTableValue^{6.42}(*v*) ...
and ... IsTabReferenceString^{6.43}(*v*) ...
and ... IsLineSpacingValue^{6.44}(*v*) ...
and ... IsCharacterLineProgressionValue^{6.45}(*v*) ...
and ... IsItemizationValue^{6.46}(*v*) ...
and ... ContainsFormattedElements^{6.47}(*v*) ...
and ... ContainsProcessableElements^{6.48}(*v*) ...
and ... ContainsFormattedProcessableElements^{6.49}(*v*) ...
and ... IsValidFormattedContentSyntax^{6.50}(*v*) ...
and ... IsValidProcessableContentSyntax^{6.51}(*v*) ...
and ... IsValidFormattedProcessableContentSyntax^{6.52}(*v*) ...
and ... IsFormattedContentElement^{6.53}(*v*) ...
and ... IsProcessableContentElement^{6.54}(*v*) ...
and ... IsFormattedProcessableContentElement^{6.55}(*v*) ...
and ... IsCommonContentElement^{6.56}(*v*) ...
and ... IsValidFormattedContentSemantics^{6.57}(*v*) ...
and ... IsValidProcessableContentSemantics^{6.58}(*v*) ...
and ... IsValidFormattedProcessableContentSemantics^{6.59}(*v*) ...
and ... IsValidCommonContentSemantics^{6.60}(*v*) ...
and ... IsValidLogicalControlSemantics^{6.61}(*v*) ...
and ... IsValidDelimiterControlSemantics^{6.62}(*v*) ...
and ... IsValidSharedControlSemantics^{6.63}(*v*) ...
and ... IsValidGCC0^{6.64}(*v*) ...
and ... IsValidGCC12^{6.65}(*v*) ...
and ... IsValidGCC12End^{6.66}(*v*) ...
and ... IsValidLF^{6.67}(*v*) ...
and ... IsValidNextLF0^{6.68}(*v*) ...
and ... IsValidNextLF1^{6.69}(*v*) ...
and ... IsValidPLUD^{6.70}(*v*) ...
and ... IsIncompletePLU^{6.71}(*v*) ...
and ... IsIncompletePLD^{6.72}(*v*) ...
and ... IsValidSRS^{6.73}(*v*) ...
and ... IsValidSRSEnd^{6.74}(*v*) ...
and ... IsValidSRSNest^{6.75}(*v*, *v*₁) ...
and ... IsValidPLUDInSRS^{6.76}(*v*) ...
and ... IsValidPLUDInSRSEnd^{6.77}(*v*) ...
and ... IsIncompletePLUInSRS^{6.78}(*v*) ...
and ... IsIncompletePLDInSRS^{6.79}(*v*) ...
and ... IsValidVP^{6.80}(*v*) ...
and ... IsValidVPSum^{6.81}(*v*, *n*) ...
and ... IsValidPTX^{6.82}(*v*) ...
and ... IsValidPTXNext^{6.83}(*v*) ...
and ... IsValidPTXEnd^{6.84}(*v*) ...
and ... IsValidSOS^{6.85}(*v*) ...
and ... IsValidSOSEnd^{6.86}(*v*) ...
and ... IsValidSOSNest^{6.87}(*v*, *v*₁) ...
and ... IsValidVPInSRS^{6.88}(*v*) ...
and ... IsValidVPSumInSRS^{6.89}(*v*, *n*) ...
and ... IsValidVPSumInSRSEnd^{6.90}(*v*) ...
and ... IsCodeExtensionControlFn^{6.91}(*v*) ...
and ... IsISO2022String^{6.92}(*v*) ...
and ... IsISO2022Character^{6.93}(*v*) ...
and ... IsISO6429String^{6.94}(*v*) ...
and ... IsISO6429Character^{6.95}(*v*) ...
and ... IsSharedControlFn^{6.96}(*v*) ...
and ... IsParameterlessSharedControlFn^{6.97}(*v*) ...

and ... IsParameterizedSharedControlFnName^{6.98}(*v*) ...
and ... IsParameterizedSharedControlFn^{6.99}(*n, p*) ...
and ... IsLayoutControlFn^{6.100}(*v*) ...
and ... IsParameterlessLayoutControlFn^{6.101}(*v*) ...
and ... IsParameterizedLayoutControlFnName^{6.102}(*v*) ...
and ... IsParameterizedLayoutControlFn^{6.103}(*n, p*) ...
and ... IsLogicalControlFn^{6.104}(*v*) ...
and ... IsParameterlessLogicalControlFn^{6.105}(*v*) ...
and ... IsParameterizedLogicalControlFnName^{6.106}(*v*) ...
and ... IsParameterizedLogicalControlFn^{6.107}(*n, p*) ...
and ... IsDelimiterControlFn^{6.108}(*v*) ...
and ... IsSpaceControlFn^{6.109}(*v*) ...
and ... IsEscapeControlFn^{6.110}(*v*) ...
and ... IsCharacterContentInformationValue^{6.111}(*v*) ...
and ... IsGraphicCharacterString^{6.112}(*v*) ...
and ... IsGraphicCharacter^{6.113}(*v*) ...

NOTE: Other predicates or operators which are used here, but are defined in clause 6, are not listed here.

C.2 Interface to the Document Profile

Semiformal Description 6.1

Predicate “is a profile defaultable character content architecture attribute” (clause 7)

A profile defaultable character content architecture attribute corresponds to the set of character presentation attributes.

NOTE: This predicate is used in annex B.

Definition 6.1

- 1 $\forall att$
- 2 $({}_o \text{IsProfileDefaultableCharacterContentArchitectureAttribute}(att) \text{ iff}$
- 3 $\text{IsCharacterContentPresentationAttribute}^{6.12}(att)_o)$

Semiformal Description 6.2

Predicate “is a profile character coding specification” (clause 8.1)

A character coding specification is a nomination where each element is a character content coding attribute.

NOTE: This predicate is used in annex B.

Definition 6.2

- 1 $\forall v$
- 2 $({}_o \text{IsProfileCharacterCodingSpecification}(v) \text{ iff}$
- 3 $\text{IsNom}(v) \text{ and}$
- 4 $\forall b \in \sim v \bullet (\text{IsCharacterContentCodingAttribute}^{6.13}(C\ b))_o)$

Semiformal Description 6.3

Predicate “is a profile character presentation feature” (clause 7)

A profile character presentation feature is a nomination where each element is a character content presentation attribute.

NOTE: This predicate is used in annex B.

Definition 6.3

- 1 $\forall v$
- 2 $({}_o \text{IsProfileCharacterPresentationFeature}(v) \text{ iff}$
- 3 $\text{IsNom}(v) \text{ and}$
- 4 $\forall b \in \sim v \bullet (\text{IsCharacterContentPresentationAttribute}^{6.12}(C\ b))_o)$

C.3 Interface to the Document Architecture

Semiformal Description 6.4

Predicate “satisfies character content architecture constraints” (clauses 4.8 and 15)

A document profile *prof* and a document body *doby* satisfy the constraints imposed by the character content architecture if the following holds for all constituents and associated content portions:

If the attribute 'content architecture class' of the constituent has the value '2 8 2 6 1' then the content portion contains processable character content (6), the attributes 'formatting indicator' and 'initial offset' are not specified for this content (7) and the value '2 8 2 6 1' is an element of the document profile attribute 'content architecture classes' (8).

If the attribute 'content architecture class' of the constituent has the value '2 8 2 6 0' then the content portion contains formatted character content (11), the attributes 'widow size', 'orphan size', 'proportional line spacing' and 'indentation' are not specified for this content (12,13) and the value '2 8 2 6 0' is an element of the document profile attribute 'content architecture classes' (14).

If the attribute 'content architecture class' has the value '2 8 2 6 2' then content portion contains formatted processable character content (17) and the value '2 8 2 6 2' is an element of the document profile attribute 'content architecture classes' (18).

NOTE: This predicate is used in clause 7 of this part of ISO 8613.

Definition 6.4

```

1   $\forall prof, doby$ 
2   $(_0 \text{SatisfiesCharacterContentArchitectureConstraints}(prof, doby) \text{ iff}$ 
3     $\forall cst, cont \in doby$ 
4     $(_1 ( _2 ( _3 (cont) \text{DescribesContPortOf}^{2.153}(cst) \text{ and}$ 
5       $C \wedge cst \bullet 'content\ architecture\ class' = '2\ 8\ 2\ 6\ 1' )_3) \text{ impl}$ 
6       $(_4 \text{IsProcessableCharacterDescription}^{6.5}(cont) \text{ and}$ 
7       $\text{IsEmptyCol}^{1.4}(['formatting\ indicator'; 'initial\ offset'] \cap \text{NAMS}^{1.18}(cst)) \text{ and}$ 
8       $'2\ 8\ 2\ 6\ 1' \in C \wedge prof \bullet 'content\ architecture\ classes' )_4)_2) \text{ and}$ 
9     $(_5 ( _6 (cont) \text{DescribesContPortOf}^{2.153}(cst) \text{ and}$ 
10       $C \wedge cst \bullet 'content\ architecture\ class' = '2\ 8\ 2\ 6\ 0' )_6) \text{ impl}$ 
11       $(_7 \text{IsFormattedCharacterDescription}^{6.7}(cont) \text{ and}$ 
12       $\text{IsEmptyCol}^{1.4}(['widow\ size'; 'orphan\ size';$ 
13       $'proportional\ line\ spacing'; 'indentation'] \cap \text{NAMS}^{1.18}(cst)) \text{ and}$ 
14       $'2\ 8\ 2\ 6\ 0' \in C \wedge prof \bullet 'content\ architecture\ classes' )_7)_5) \text{ and}$ 
15     $(_8 ( _9 (cont) \text{DescribesContPortOf}^{2.153}(cst) \text{ and}$ 
16       $C \wedge cst \bullet 'content\ architecture\ class' = '2\ 8\ 2\ 6\ 2' )_9) \text{ impl}$ 
17       $(_{10} \text{IsFormattedProcessableCharacterDescription}^{6.9}(cont) \text{ and}$ 
18       $'2\ 8\ 2\ 6\ 2' \in C \wedge prof \bullet 'content\ architecture\ classes' )_{10})_8)_1)_0)$ 

```

Semiformal Description 6.5

Predicate “is processable character description” (clause 15)

Content is processable if it is a character content portion description and the character content is processable.

Definition 6.5

```

1   $\forall cont$ 
2   $(_0 \text{IsProcessableCharacterDescription}(cont) \text{ iff}$ 
3     $\text{IsCharacterContentPortionDescription}^{6.11}(cont) \text{ and}$ 
4     $\text{IsProcessableCharacterContent}^{6.6}(cont)_0)$ 

```

Semiinformal Description 6.6

Predicate “is processable character content” (clause 15.2 and table 6)

A processable character content portion is a catenation containing a processable character string.

Definition 6.6

- 1 $\forall cont$
- 2 $({}_o \text{IsProcessableCharacterContent}(cont) \text{ iff}$
- 3 $\forall a \in \sim cont \bullet$
- 4 $(N a = \text{'content information'} \text{ } \underline{impl} \text{ ContainsProcessableElements}^{6.48}(C a))_o)$

Semiinformal Description 6.7

Predicate “is formatted character description” (clause 15)

Content is formatted if it is a character content portion description and the character content is formatted.

Definition 6.7

- 1 $\forall cont$
- 2 $({}_o \text{IsFormattedCharacterDescription}(cont) \text{ iff}$
- 3 $\text{IsCharacterContentPortionDescription}^{6.11}(cont) \underline{impl}$
- 4 $\text{IsFormattedCharacterContent}^{6.8}(cont)_o)$

Semiinformal Description 6.8

Predicate “is formatted character content” (clause 15.1 and table 6)

A formatted character content portion is a catenation containing a formatted character string.

Definition 6.8

- 1 $(clause 15) \forall cont$
- 2 $({}_o \text{IsFormattedCharacterContent}(cont) \text{ iff}$
- 3 $\forall a \in \sim cont \bullet$
- 4 $(N a = \text{'content information'} \text{ } \underline{impl} \text{ ContainsFormattedElements}^{6.47}(C a))_o)$

Semiinformal Description 6.9

Predicate “is formatted processable character description” (clause 15)

Content is formatted processable if it is a character content portion description and the character content is formatted processable.

Definition 6.9

- 1 $\forall cont$
- 2 $({}_o \text{IsFormattedProcessableCharacterDescription}(cont) \text{ iff}$
- 3 $\text{IsCharacterContentPortionDescription}^{6.11}(cont) \underline{impl}$
- 4 $\text{IsFormattedProcessableCharacterContent}^{6.10}(cont)_o)$

Semiformal Description 6.10

Predicate “is formatted processable character content” (clause 15.3 and table 6)

A formatted processable character content is a catenation containing a formatted processable character string.

Definition 6.10

- 1 $\forall cont$
- 2 $({}_o \text{IsFormattedProcessableCharacterContent}(cont) \text{ iff}$
- 3 $\forall a \in {}^{\sim}cont.$
- 4 $(\text{N } a = \text{'content information' } \underline{impl} \text{ ContainsFormattedProcessableElements}^{6.49}(C a))_o)$

Semiformal Description 6.11

Predicate “is character content portion description” (clauses 8.1 and 8.3)

A character content portion description is a set of character content portion attributes.

NOTE: This predicate is used in clause 7 of this part of ISO 8613.

Definition 6.11

- 1 $\forall cont$
- 2 $({}_o \text{IsCharacterContentPortionDescription}(cont) \text{ iff}$
- 3 $\text{IsCharacterContentPortionAttributeSet}^{6.14}(cont)_o)$

Semiformal Description 6.12

Predicate “is character content presentation attribute” (clauses 4.3 and 7)

A character content architecture presentation attribute is one of the attributes 'alignment', 'character fonts', 'character orientation', 'character path', 'character spacing', 'code extension announcers', 'first line offset', 'formatting indicator', 'graphic character sets', 'graphic character subrepertoire', 'graphic rendition', 'indentation', 'initial offset', 'itemization', 'kerning offset', 'line layout table', 'line spacing', 'line progression', 'orphan size', 'pairwise kerning', 'proportional line spacing' or 'widow size' with corresponding value(s).

NOTE: This predicate is used in clause 7 of this part of ISO 8613.

Definition 6.12

- 1 $\forall att$
- 2 $({}_o \text{IsCharacterContentPresentationAttribute}(att) \text{ iff}$
- 3 $\exists n, c$
- 4 $({}_1 att = [n : c] \text{ and}$
- 5 $n \in [\text{'alignment'}; \text{'character fonts'}; \text{'character orientation'};$
- 6 $\text{'character path'}; \text{'character spacing'}; \text{'code extension announcers'};$
- 7 $\text{'first line offset'}; \text{'formatting indicator'}; \text{'graphic character sets'};$
- 8 $\text{'graphic rendition'}; \text{'indentation'}; \text{'graphic character subrepertoire'};$
- 9 $\text{'initial offset'}; \text{'itemization'}; \text{'kerning offset'};$
- 10 $\text{'line layout table'}; \text{'line progression'}; \text{'line spacing'};$
- 11 $\text{'orphan size'}; \text{'pairwise kerning'}; \text{'proportional line spacing'};$
- 12 $\text{'widow size'}] \text{ and}$
- 13 $({}_2 n = \text{'alignment' } \underline{impl}$
- 14 $({}_3 \text{IsPlaceholder}^{1.19}(c) \text{ or } \text{IsAlignmentValue}^{6.15}(c)_2) \text{ and}$

15 (₄ *n* = 'character fonts' impl
 16 (₅ IsPlaceholder^{1.19}(*c*) or IsCharacterFontsValue^{6.16}(*c*)₅)₄) and
 17 (₆ *n* = 'character orientation' impl
 18 (₇ IsPlaceholder^{1.19}(*c*) or IsCharacterOrientationValue^{6.17}(*c*)₇)₆) and
 19 (₈ *n* = 'character path' impl
 20 (₉ IsPlaceholder^{1.19}(*c*) or IsCharacterPathValue^{6.19}(*c*)₉)₈) and
 21 (₁₀ *n* = 'character spacing' impl
 22 (₁₁ IsPlaceholder^{1.19}(*c*) or IsCharacterSpacingValue^{6.21}(*c*)₁₁)₁₀) and
 23 (₁₂ *n* = 'code extension announcers' impl
 24 (₁₃ IsPlaceholder^{1.19}(*c*) or IsCodeExtensionAnnouncersValue^{6.38}(*c*)₁₃)₁₂) and
 25 (₁₄ *n* = 'first line offset' impl
 26 (₁₅ IsPlaceholder^{1.19}(*c*) or IsFirstLineOffsetValue^{6.22}(*c*)₁₅)₁₄) and
 27 (₁₆ *n* = 'formatting indicator' impl
 28 (₁₇ IsPlaceholder^{1.19}(*c*) or IsFormattingIndicatorValue^{6.18}(*c*)₁₇)₁₆) and
 29 (₁₈ *n* = 'graphic character sets' impl
 30 (₁₉ IsPlaceholder^{1.19}(*c*) or IsCharacterSetsValue^{6.23}(*c*)₁₉)₁₈) and
 31 (₂₀ *n* = 'graphic character subrepertoire' impl
 32 (₂₁ IsPlaceholder^{1.19}(*c*) or IsGraphicCharacterSubrepertoireValue^{6.24}(*c*)₂₁)₂₀) and
 33 (₂₂ *n* = 'graphic rendition' impl
 34 (₂₃ IsPlaceholder^{1.19}(*c*) or IsGraphicRenditionValue^{6.27}(*c*)₂₃)₂₂) and
 35 (₂₄ *n* = 'indentation' impl
 36 (₂₅ IsPlaceholder^{1.19}(*c*) or IsIndentationValue^{6.34}(*c*)₂₅)₂₄) and
 37 (₂₆ *n* = 'initial offset' impl
 38 (₂₇ IsPlaceholder^{1.19}(*c*) or IsCharacterInitialOffsetValue^{6.35}(*c*)₂₇)₂₆) and
 39 (₂₈ *n* = 'itemization' impl
 40 (₂₉ IsPlaceholder^{1.19}(*c*) or IsItemizationValue^{6.46}(*c*)₂₉)₂₈) and
 41 (₃₀ *n* = 'kerning offset' impl
 42 (₃₁ IsPlaceholder^{1.19}(*c*) or IsKerningOffsetValue^{6.36}(*c*)₃₁)₃₀) and
 43 (₃₂ *n* = 'line layout table' impl
 44 (₃₃ IsPlaceholder^{1.19}(*c*) or IsLineLayoutTableValue^{6.42}(*c*)₃₃)₃₂) and
 45 (₃₄ *n* = 'line spacing' impl
 46 (₃₅ IsPlaceholder^{1.19}(*c*) or IsLineSpacingValue^{6.44}(*c*)₃₅)₃₄) and
 47 (₃₆ *n* = 'line progression' impl
 48 (₃₇ IsPlaceholder^{1.19}(*c*) or IsCharacterLineProgressionValue^{6.45}(*c*)₃₇)₃₆) and
 49 (₃₈ *n* = 'orphan size' impl
 50 (₃₉ IsPlaceholder^{1.19}(*c*) or IsOrphanSizeValue^{6.37}(*c*)₃₉)₃₈) and
 51 (₄₀ *n* = 'pairwise kerning' impl
 52 (₄₁ IsPlaceholder^{1.19}(*c*) or IsPairwiseKerningValue^{6.39}(*c*)₄₁)₄₀) and
 53 (₄₂ *n* = 'proportional line spacing' impl
 54 (₄₃ IsPlaceholder^{1.19}(*c*) or IsProportionalLineSpacingValue^{6.41}(*c*)₄₃)₄₂) and
 55 (₄₄ *n* = 'widow size' impl
 56 (₄₅ IsPlaceholder^{1.19}(*c*) or IsWidowSizeValue^{6.40}(*c*)₄₅)₄₄)₀)

Semiformal Description 6.13

Predicate “is a character content coding attribute” (clause 8.1)

A character content coding attribute consists of the attribute 'type of coding' with its corresponding value.

Definition 6.13

```

1   $\forall att$ 
2   $({}_o \text{IsCharacterContentCodingAttribute}(att) \text{ iff }$ 
3     $\exists n, c$ 
4     $({}_1 att = [n : c] \text{ and }$ 
5       $n = \text{'type of coding'} \text{ impl } \text{IsCharacterContentTypeOfCodingValue}^{6.20}(c)_1)_o$ 

```

C.4 Attributes of the Character Content Architecture

Semiformal Description 6.14

Predicate “is character content portion attribute set” (clause 8)

A character content architecture portion attribute set contains the listed attributes with corresponding attribute values.

Definition 6.14

```

1   $\forall as$ 
2   $({}_o \text{IsCharacterContentPortionAttributeSet}(as) \text{ iff }$ 
3     $({}_1 \text{IsNeNom}^{1.2}(as) \text{ and }$ 
4       $\forall a \in \neg as \bullet$ 
5         $({}_2 N a = \text{'type of coding'} \text{ impl }$ 
6           $({}_3 \text{IsPlaceholder}^{1.19}(C a) \text{ or } \text{IsCharacterContentTypeOfCodingValue}^{6.20}(C a)_3)_2 \text{ and }$ 
7           $({}_4 N a = \text{'content information'} \text{ impl } \text{IsCharacterContentInformationValue}^{6.111}(C a)_4)_1)_o$ 

```

Semiformal Description 6.15

Predicate “is an alignment value” (clause 7.1.1)

The value of the attribute 'alignment' is 'start-aligned', 'end-aligned', 'centred' or 'justified'.

Definition 6.15

```

1   $\forall v$ 
2   $({}_o \text{IsAlignmentValue}(v) \text{ iff }$ 
3     $v \in [\text{'start-aligned'}; \text{'end-aligned'}; \text{'centred'}; \text{'justified'}]_o$ 

```

Semiformal Description 6.16

Predicate “is a character fonts value” (clause 7.1.2)

The value of the attribute 'character fonts' can contain up to ten pairs of parameters (3) named 'primary font', 'first alternative font', 'second alternative font', 'third alternative font', 'fourth alternative font', 'fifth alternative font', 'sixth alternative font', 'seventh alternative font', 'eighth alternative font' and 'ninth alternative font' (4-8), each with sub-parameters 'font size' and 'font identifier' (10), both having a positive integer value (11).

Definition 6.16

```

1   $\forall v$ 
2   $({}_0 \text{IsCharacterFontsValue}(v) \text{ iff}$ 
3     $({}_1 \text{IsNom}(v) \text{ and } \text{CARD}(v) \leq 10 \text{ and}$ 
4       $\text{NAMS}^{1.18}(v) \subseteq [\text{'primary font'; 'first alternative font';$ 
5         $\text{'second alternative font'; 'third alternative font';$ 
6         $\text{'fourth alternative font'; 'fifth alternative font';$ 
7         $\text{'sixth alternative font'; 'seventh alternative font';$ 
8         $\text{'eighth alternative font'; 'ninth alternative font'}] \text{ and}$ 
9     $\forall a \in \sim v.$ 
10      $({}_2 \text{IsNom}(C a) \text{ and } \text{NAMS}^{1.18}(C a) = [\text{'font size'; 'font identifier'}] \text{ and}$ 
11      $\forall b \in \sim(C a). \text{IsNat}(C b)_2)_1)_0$ 

```

Semiformal Description 6.17

Predicate “is a character orientation value” (clause 7.1.3)

The value of the attribute 'character orientation' is '0°', '90°', '180°' or '270°'.

Definition 6.17

```

1   $\forall v$ 
2   $({}_0 \text{IsCharacterOrientationValue}(v) \text{ iff}$ 
3     $v \in [\text{'0°'; '90°'; '180°'; '270°'}]_0)$ 

```

Semiformal Description 6.18

Predicate “is a formatting indicator value” (clause 7.2.1)

The attribute 'formatting indicator' has the value 'yes' or 'no'.

Definition 6.18

```

1   $\forall v$ 
2   $({}_0 \text{IsFormattingIndicatorValue}(v) \text{ iff}$ 
3     $v \in [\text{'yes'; 'no'}]_0)$ 

```

Semiformal Description 6.19

Predicate “is a character path value” (clause 7.1.4)

The value of the attribute 'character path' is '0°', '90°', '180°' or '270°'.

Definition 6.19

```

1   $\forall v$ 
2   $({}_0 \text{IsCharacterPathValue}(v) \text{ iff}$ 
3     $v \in [\text{'0°'; '90°'; '180°'; '270°'}]_0)$ 

```

Semiformal Description 6.20

Predicate “is a character content type of coding value” (clause 8.1)

The value of the attribute 'type of coding' is an ASN.1 object identifier '2 8 3 6 0'.

Definition 6.20

- 1 $\forall v$
- 2 $({}_0\text{IsCharacterContentTypeOfCodingValue}(v) \text{ iff}$
- 3 $v = '2\ 8\ 3\ 6\ 0'_{\text{o}})$

Semiformal Description 6.21

Predicate “is a character spacing value” (clause 7.1.5)

The value of the attribute 'character spacing' is any positive integer.

Definition 6.21

- 1 $\forall v$
- 2 $({}_0\text{IsCharacterSpacingValue}(v) \text{ iff}$
- 3 $\text{IsNat}(v)_{\text{o}})$

Semiformal Description 6.22

Predicate “is a first line offset value” (clause 7.1.7)

The value of the attribute 'first line offset' is any integer.

Definition 6.22

- 1 $\forall v$
- 2 $({}_0\text{IsFirstLineOffsetValue}(v) \text{ iff}$
- 3 $\text{IsInt}(v)_{\text{o}})$

Semiformal Description 6.23

Predicate “is a character sets value” (clause 7.1.8)

The value of the attribute 'graphic character sets' is a string of escape sequences (in accordance with ISO 2022 and ISO 2375) found in the *ISO International register of coded character sets to be used with escape sequences* (held by the *European Computer Manufacturers Association* (ECMA) – the registration authority). These escape sequences are used to designate one or more graphic character sets, and any locking shift functions needed for their invocation.

NOTE: This predicate is used in annex B.

Definition 6.23

- 1 $\forall v$
- 2 $({}_0\text{IsCharacterSetsValue}(v) \text{ iff}$
- 3 $\text{IsISO2022String}^{6.92}(v)_{\text{o}})$

Semiformal Description 6.24

Predicate “is a graphic character subrepertoire value” (clause 7.1.9)

The value of the attribute 'graphic character subrepertoire' is either 0 or an identifier of a subrepertoire.

Definition 6.24

- 1 $\forall v$
- 2 $({}_0 \text{IsGraphicCharacterSubrepertoireValue}(v) \text{ iff}$
- 3 $v = 0 \text{ or } \text{IsISO6937SubrepertoireId}^{6.25}(v)_0)$

Semiformal Description 6.25

Predicate “is a ISO 6937 subrepertoire identifier” (clause 7.1.9)

An ISO 6937 subrepertoire identifier is considered atomic for this definition.

Definition 6.25

- 1 $\forall v$
- 2 $({}_0 \text{IsISO6937SubrepertoireId}(v) \text{ iff}$
- 3 $\text{IsAtom}(v)_0)$

Semiformal Description 6.26

Predicate “is a character content architecture class value” (clause 7.4.1)

A content architecture class attribute value is an ASN.1 object identifier '2 8 2 6 1', '2 8 2 6 2' or '2 8 2 6 0'.

Definition 6.26

- 1 $\forall v$
- 2 $({}_0 \text{IsCharacterContentArchitectureClassValue}(v) \text{ iff}$
- 3 $v \in ['2\ 8\ 2\ 6\ 1'; '2\ 8\ 2\ 6\ 2'; '2\ 8\ 2\ 6\ 0']_0)$

Semiformal Description 6.27

Predicate “is a graphic rendition value” (clauses 7.1.10 and 6.1)

The value of the attribute 'graphic rendition' can contain any sequence of integer values from those specified below (4-12).

Definition 6.27

- 1 $\forall v$
- 2 $({}_0 \text{IsGraphicRenditionValue}(v) \text{ iff}$
- 3 $\text{IsNeCat}^{1.3}(v) \text{ and}$
- 4 $({}_1 v = [\rightarrow 0 \rightarrow] \text{ or}$
- 5 $\forall x \in {}^{\sim}v \bullet$
- 6 $({}_2 \text{IsWeightValue}^{6.28}(x) \text{ or}$
- 7 $\text{IsPostureValue}^{6.29}(x) \text{ or}$
- 8 $\text{IsUnderliningValue}^{6.30}(x) \text{ or}$
- 9 $\text{IsBlinkingValue}^{6.31}(x) \text{ or}$
- 10 $\text{IsImageInversionValue}^{6.32}(x) \text{ or}$
- 11 $\text{IsCrossingOutValue}^{6.33}(x) \text{ or}$
- 12 $x \in [10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 26; 50]_2)_1)_0)$