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

Part 10:
Formal specifications

AMENDMENT 2: Formal specification of the Raster Graphics content architectures

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

Partie 10: Spécifications formelles

AMENDEMENT 2: Spécification formelle de l'architecture des contenus des caractères graphiques à raster

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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Annex D

(normative)

Formal specification of the raster graphics content architectures

D.1 Introduction

This annex gives a formal specification of the raster graphics content architectures as described in part 7 of ISO 8613. This annex is composed of 5 clauses:

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

Clause D.2 provides the interface to the document profile and its formal specification.

Clauses D.3 and D.4 provide the interface to the document architecture by giving a formal specification of raster graphics presentation attributes and content portion attributes that apply to raster graphics content portions.

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

At any time a clause number is specified in the semi-formal descriptions this refers to a clause number in ISO 8613-7.

What follows is the outline of the formula which specifies the raster graphics content architecture. 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.

... IsDefaultableRasterGraphicsContentArchitectureAttribute$^{7.1}$(att) ...
and ... IsRasterGraphicsCodingSpecification$^{7.2}$(v) ...
and ... IsRasterGraphicsPresentationFeature$^{7.3}$(v) ...
and ... SatisfiesRasterGraphicsContentArchitectureConstraints$^{7.4}$($prof$, $doby$) ...
and ... IsFormattedProcessableRasterGraphicsContent$^{7.5}$($cont$) ...
and ... IsFormattedRasterGraphicsContent$^{7.6}$($cont$) ...
and ... IsRasterGraphicsContentPortionDescription$^{7.7}$($cont$) ...
and ... IsRasterGraphicsContentPresentationAttribute$^{7.8}$(att) ...
and ... IsRasterGraphicsContentCodingAttribute$^{7.9}$(att) ...
and ... IsRasterGraphicsContentPortionAttributeSet$^{7.10}$(as) ...
and ... IsClippingValue$^{7.11}$(v) ...
and ... IsRasterGraphicsLineProgressionValue$^{7.12}$(v) ...
and ... IsPelPathValue$^{7.13}$(v) ...
and ... IsRasterGraphicsInitialOffsetValue$^{7.14}$(v) ...
and ... IsPelTransmissionDensityValue$^{7.15}$(v) ...
and ... IsImageDimensionsValue$^{7.16}$(v) ...
and ... IsPelSpacingValue$^{7.17}$(v) ...
and ... IsSpacingRatioValue$^{7.18}$(v) ...
and ... IsRasterGraphicsContentArchitectureClassValue$^{7.19}$(v) ...
and ... IsRasterGraphicsContentTypeOfCodingValue$^{7.20}$(v) ...
and ... IsCompressionValue$^{7.21}$(v) ...
and ... IsNumberOfLinesValue$^{7.22}$(v) ...
and ... IsNumberOfPelsPerLineValue$^{7.23}$(v) ...
and ... IsNumberOfDiscardedPelsValue$^{7.24}$(v) ...
and ... IsRasterGraphicsContentInformationValue$^{7.25}$(v) ...

and ... IsNumberOfLinesPerTileValue$^{7.26}(v)$ ...
and ... IsNumberOfPelsPerTileLineValue$^{7.27}(v)$ ...
and ... IsTilingOffsetValue$^{7.28}(v)$ ...
and ... IsTileTypesValue$^{7.29}(v)$ ...
and ... IsTileEncodingValue$^{7.30}(v)$ ...

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

D.2 Interface to the Document Profile

Semiformal Description 7.1

Predicate "is a defaultable raster graphics content architecture attribute"

A defaultable raster graphics content architecture attribute is one of the attributes 'clipping', 'compression', 'image dimensions', 'initial offset', 'line progression', 'number of discarded pels', 'number of lines per tile', 'number of pels per line', 'number of pels per tile line', 'pel path', 'pel spacing', 'pel transmission density', 'spacing ratio', 'tile types', 'tiling offset' or 'type of coding' with an appropriate value.

NOTE — This predicate is used in annex B.

Definition 7.1

1 $\forall att$
2 $(_0$IsDefaultableRasterGraphicsContentArchitectureAttribute(att) *iff*
3 $\exists n, c$
4 $(_1\ att = [n : c]$ *and*
5 $n \in$ ['clipping'; 'compression';
6 'image dimensions'; 'initial offset';
7 'line progression'; 'number of discarded pels';
8 'number of lines per tile'; 'number of pels per line';
9 'number of pels per tile line'; 'pel path';
10 'pel spacing'; 'pel transmission density';
11 'spacing ratio'; 'tile types';
12 'tiling offset'; 'type of coding'] *and*
13 $(_2\ n =$ 'clipping' *impl* IsClippingValue$^{7.11}(c)\ _2)$ *and*
14 $(_3\ n =$ 'compression' *impl* IsCompressionValue$^{7.21}(c)\ _3)$ *and*
15 $(_4\ n =$ 'image dimensions' *impl* IsImageDimensionsValue$^{7.16}(c)\ _4)$ *and*
16 $(_5\ n =$ 'initial offset' *impl* IsRasterGraphicsInitialOffsetValue$^{7.14}(c)\ _5)$ *and*
17 $(_6\ n =$ 'line progression' *impl* IsRasterGraphicsLineProgressionValue$^{7.12}(c)\ _6)$ *and*
18 $(_7\ n =$ 'number of discarded pels' *impl* IsNumberOfDiscardedPelsValue$^{7.24}(c)\ _7)$ *and*
19 $(_8\ n =$ 'number of lines per tile' *impl* IsNumberOfLinesPerTileValue$^{7.26}(c)\ _8)$ *and*
20 $(_9\ n =$ 'number of pels per line' *impl* IsNumberOfPelsPerLineValue$^{7.23}(c)\ _9)$ *and*
21 $(_{10}\ n =$ 'number of pels per tile line' *impl* IsNumberOfPelsPerTileLineValue$^{7.27}(c)\ _{10})$ *and*
22 $(_{11}\ n =$ 'pel path' *impl* IsPelPathValue$^{7.13}(c)\ _{11})$ *and*
23 $(_{12}\ n =$ 'pel spacing' *impl* IsPelSpacingValue$^{7.17}(c)\ _{12})$ *and*
24 $(_{13}\ n =$ 'pel transmission density' *impl* IsPelTransmissionDensityValue$^{7.15}(c)\ _{13})$ *and*
25 $(_{14}\ n =$ 'spacing ratio' *impl* IsSpacingRatioValue$^{7.18}(c)\ _{14})$ *and*
26 $(_{15}\ n =$ 'tile types' *impl* IsTileTypesValue$^{7.29}(c)\ _{15})$ *and*
27 $(_{16}\ n =$ 'tiling offset' *impl* IsTilingOffsetValue$^{7.28}(c)\ _{16})$ *and*
28 $(_{17}\ n =$ 'type of coding' *impl* IsRasterGraphicsContentTypeOfCodingValue$^{7.20}(c)\ _{17})_1)_0)$

Semiformal Description 7.2

Predicate "is a raster graphics coding specification"

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

NOTE — This predicate is used in annex B.

Definition 7.2

```
1   ∀ v
2   (0 IsRasterGraphicsCodingSpecification(v) iff
3     (1 IsNom(v) and
4       ∀ b ∈̂ v • (IsRasterGraphicsContentCodingAttribute^7.9(C b)) 1)0)
```

Semiformal Description 7.3

Predicate "is a raster graphics presentation feature"

A raster graphics presentation feature is a nomination where each element is a raster graphics content presentation attribute.

NOTE — This predicate is used in annex B.

Definition 7.3

```
1   ∀ v
2   (0 IsRasterGraphicsPresentationFeature(v) iff
3     (1 IsNom(v) and
4       ∀ b ∈̂ v • (IsRasterGraphicsContentPresentationAttribute^7.8(C b)) 1)0)
```

D.3 Interface to the Document Architecture

Semiformal Description 7.4

Predicate "satisfies raster graphics content architecture constraints"

A document profile *prof* and a document body *doby* satisfy the constraints imposed by the raster graphics content architecture if the following holds:

For all constituents for which the attribute 'content architecture class' is specified and has the value '2 8 2 7 2' (4), the content portion is a formatted processable raster graphics content portion (5).

For all constituents for which the attribute 'content architecture class' is specified and has the value '2 8 2 7 0' (6), the content portion is a formatted raster graphics content portion (7).

The value '2 8 2 7 2' appears in the document profile attribute 'content architecture classes' if and only if there exists a content portion for which the attribute 'content architecture class' has also this value (8, 9).

The value '2 8 2 7 0' appears in the document profile attribute 'content architecture classes' if and only if there exists a content portion for which the attribute 'content architecture class' has also this value (10, 11).

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

Definition 7.4

```
1   ∀ prof, doby
2   (0 SatisfiesRasterGraphicsContentArchitectureConstraints(prof, doby) iff
3     ∀ cont ∈ doby
4     (1 (2 C ^cont • 'content architecture class' = '2 8 2 7 2' impl
5         IsFormattedProcessableRasterGraphicsContent^7.5(cont)2) and
6       (3 C ^cont • 'content architecture class' = '2 8 2 7 0' impl
7         IsFormattedRasterGraphicsContent^7.6(cont)3)1) and
8     '2 8 2 7 2' ∈ C ^prof • 'content architecture classes' iff
9     ∃ cont ∈ doby (C ^cont • 'content architecture class' = '2 8 2 7 2') and
10    '2 8 2 7 0' ∈ C ^prof • 'content architecture classes' iff
11    ∃ cont ∈ doby (C ^cont • 'content architecture class' = '2 8 2 7 0') 0)
```

Semiformal Description 7.5

Predicate "is formatted processable raster graphics content"

A formatted processable raster graphics content portion is a raster graphics content portion description. The attribute 'number of pels per line' is explicitly specified and the attribute 'number of discarded pels' is not specified.

Definition 7.5

```
1   ∀ cont
2   (0 IsFormattedProcessableRasterGraphicsContent(cont) iff
3     (1 IsRasterGraphicsContentPortionDescription^7.7(cont) and
4       not IsPlaceholder^1.19(C ^cont • 'number of pels per line') and
5       not 'number of discarded pels' ∈ NAMS^1.18(cont)1)0)
```

Semiformal Description 7.6

Predicate "is formatted raster graphics content"

A formatted raster graphics content portion is a raster graphics content portion description. The attributes 'number of lines', 'number of lines per tile', 'number of pels per tile line', 'tile types' and 'tiling offset' are not specified.

Definition 7.6

```
1   ∀ cont
2   (0 IsFormattedRasterGraphicsContent(cont) iff
3     (1 IsRasterGraphicsContentPortionDescription^7.7(cont) and
4       ['number of lines'; 'number of lines per tile'; 'number of pels per tile line';
5        'tile types'; 'tiling offset'] ∩ NAMS^1.18(cont) = [ : ]1)0)
```

Semiformal Description 7.7

Predicate "is a raster graphics content portion description" (clause 7)

A raster graphics content portion description is a set of raster graphics content portion attributes, which are 'compression', 'content information', 'number of discarded pels', 'number of lines', 'number of lines per tile', 'number of pels per line', 'number of pels per tile line', 'tile types', 'tiling offset' and 'type of coding' (6–10). The attributes 'compression', 'content information', 'number of pels per line' and 'type of coding' must be present (4, 5). If the value of the attribute 'type of coding' is '2 8 3 7 5' (tiled encoding), the attributes 'number of lines per tile', 'number of pels per tile line', 'tile types' and 'tiling offset' must also be specified (11–13). If the attribute 'tiling offset' is specified, the first component of the value of this attribute must be less than the value of the attribute 'number of pels per tile line' and the last (second) component must be less than the value of the attribute 'number of lines per tile' (14–16).

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

Definition 7.7

```
1   ∀ cont
2   (0 IsRasterGraphicsContentPortionDescription(cont) iff
3     (1 IsRasterGraphicsContentPortionAttributeSet^7.10(cont) and
4       NAMS^1.18(cont) ⊇ ['compression';                 'content information';
5                          'number of pels per line';     'type of coding'] and
6       NAMS^1.18(cont) ⊆ ['compression';                 'content information';
7                          'number of discarded pels';    'number of lines';
8                          'number of lines per tile';    'number of pels per line';
9                          'number of pels per tile line'; 'tile types';
10                         'tiling offset';               'type of coding'] and
11      (2 C ^cont • 'type of coding' = '2 8 3 7 5' impl
12        NAMS^1.18(cont) ⊇
13        ['number of lines per tile'; 'number of pels per tile line'; 'tile types'; 'tiling offset']2) and
14      (3 'tiling offset' ∈ NAMS^1.18(cont) impl
15        (4 HEAD^1.13(C ^cont • 'tiling offset') < C ^cont • 'number of pels per tile line' and
16          LASTC^1.14 (C ^cont • 'tiling offset') < C ^cont • 'number of lines per tile'4)3)1)0)
```

Semiformal Description 7.8

Predicate "is a raster graphics content presentation attribute" (clause 6)

A raster graphics content presentation attribute is one of the attributes 'clipping', 'image dimensions', 'initial offset', 'line progression', 'pel path', 'pel spacing', 'pel transmission density' or 'spacing ratio' with an appropriate value.

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

Definition 7.8

```
1   ∀ att
2   (0 IsRasterGraphicsContentPresentationAttribute(att) iff
3     ∃ n, c
4     (1 att = [n : c] and
5       n ∈ ['clipping';                    'image dimensions';
6             'initial offset';             'line progression';
7             'pel path';                   'pel spacing';
8             'pel transmission density'; 'spacing ratio'] and
9       (2 n = 'clipping' impl
10        (3 IsPlaceholder^1.19(c) or IsClippingValue^7.11(c) 3)2) and
11      (4 n = 'image dimensions' impl
12        (5 IsPlaceholder^1.19(c) or IsImageDimensionsValue^7.16(c) 5)4) and
13      (6 n = 'initial offset' impl
14        (7 IsPlaceholder^1.19(c) or IsRasterGraphicsInitialOffsetValue^7.14(c) 7)6) and
15      (8 n = 'line progression' impl
16        (9 IsPlaceholder^1.19(c) or IsRasterGraphicsLineProgressionValue^7.12(c) 9)8) and
17      (10 n = 'pel path' impl
18        (11 IsPlaceholder^1.19(c) or IsPelPathValue^7.13(c) 11)10) and
19      (12 n = 'pel spacing' impl
20        (13 IsPlaceholder^1.19(c) or IsPelSpacingValue^7.17(c) 13)12) and
21      (14 n = 'pel transmission density' impl
22        (15 IsPlaceholder^1.19(c) or IsPelTransmissionDensityValue^7.15(c) 15)14) and
23      (16 n = 'spacing ratio' impl
24        (17 IsPlaceholder^1.19(c) or IsSpacingRatioValue^7.18(c) 17)16)1)0)
```

Semiformal Description 7.9

Predicate "is a raster graphics content coding attribute" (clauses 7.1 and 7.2)

A raster graphics content coding attribute is one of the attributes 'compression', 'number of discarded pels', 'number of lines', 'number of lines per tile', 'number of pels per line', 'number of pels per tile line', 'tile types', 'tiling offset' and 'type of coding' with an appropriate value.

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

Definition 7.9

```
1   ∀ att
2   (0 IsRasterGraphicsContentCodingAttribute(att) iff
3     ∃ n, c
4     (1 att = [n : c] and
5       n ∈ ['compression'; 'number of discarded pels'; 'number of lines'; 'number of lines per tile';
6             'number of pels per line'; 'number of pels per tile line'; 'tile types'; 'tiling offset';
7             'type of coding'] and
8       (2 n = 'compression' impl
9         (3 IsPlaceholder^1.19(c) or IsCompressionValue^7.21(c) 3)2) and
10      (4 n = 'number of discarded pels' impl
11        (5 IsPlaceholder^1.19(c) or IsNumberOfDiscardedPelsValue^7.24(c) 5)4) and
12      (6 n = 'number of lines' impl IsNumberOfLinesValue^7.22(c) 6) and
13      (7 n = 'number of lines per tile' impl
14        (8 IsPlaceholder^1.19(c) or IsNumberOfLinesPerTileValue^7.26(c) 8)7) and
15      (9 n = 'number of pels per line' impl
16        (10 IsPlaceholder^1.19(c) or IsNumberOfPelsPerLineValue^7.23(c) 10)9) and
17      (11 n = 'number of pels per tile line' impl
18        (12 IsPlaceholder^1.19(c) or IsNumberOfPelsPerTileLineValue^7.27(c) 12)11) and
19      (13 n = 'tile types' impl
20        (14 IsPlaceholder^1.19(c) or IsTileTypesValue^7.29(c) 14)13) and
21      (15 n = 'tiling offset' impl
22        (16 IsPlaceholder^1.19(c) or IsTilingOffsetValue^7.28(c) 16)15) and
23      (17 n = 'type of coding' impl
24        (18 IsPlaceholder^1.19(c) or IsRasterGraphicsContentTypeOfCodingValue^7.20(c) 18)17)1)0)
```

D.4 Attributes of the Raster Graphics Content Architecture

Semiformal Description 7.10

Predicate "is a raster graphics content portion attribute set"

A raster graphics content portion attribute set contains one or more of the attributes 'compression', 'content information', 'number of discarded pels', 'number of lines', 'number of lines per tile', 'number of pels per line', 'number of pels per tile line', 'tile types', 'tiling offset' and 'type of coding' with an appropriate value.

Definition 7.10

```
1   ∀ as
2   (0 IsRasterGraphicsContentPortionAttributeSet(as) iff
3     (1 IsNeNom1.2(as) and
4       ∀ a ∈̂ ^as •
5       (2 (3 N a = 'compression' impl
6           (4 IsPlaceholder1.19(C a) or IsCompressionValue7.21(C a) 4)3) and
7         (5 N a = 'content information' impl
8           (6 IsPlaceholder1.19(C a) or IsRasterGraphicsContentInformationValue7.25(C a) 6)5) and
9         (7 N a = 'number of discarded pels' impl
10          (8 IsPlaceholder1.19(C a) or IsNumberOfDiscardedPelsValue7.24(C a) 8)7) and
11        (9 N a = 'number of lines' impl IsNumberOfLinesValue7.22(C a) 9) and
12        (10 N a = 'number of lines per tile' impl
13          (11 IsPlaceholder1.19(c) or IsNumberOfLinesPerTileValue7.26(c) 11)10) and
14        (12 N a = 'number of pels per line' impl
15          (13 IsPlaceholder1.19(C a) or IsNumberOfPelsPerLineValue7.23(C a) 13)12) and
16        (14 N a = 'number of pels per tile line' impl
17          (15 IsPlaceholder1.19(c) or IsNumberOfPelsPerTileLineValue7.27(c) 15)14) and
18        (16 N a = 'tile types' impl
19        (17 IsPlaceholder1.19(c) or IsTileTypesValue7.29(c) 17)16) and
20        (18 N a = 'tiling offset' impl
21          (19 IsPlaceholder1.19(c) or IsTilingOffsetValue7.28(c) 19)18) and
22        (20 N a = 'type of coding' impl
23          (21 IsPlaceholder1.19(C a) or IsRasterGraphicsContentTypeOfCodingValue7.20(C a) 21)20)2)1)0)
```

Semiformal Description 7.11

Predicate "is a clipping value" (clause 6.1.1)

The value of the attribute 'clipping' is a catenation of two elements where each element is a pair of non-negative integers.

Definition 7.11

```
1   ∀ v
2   (0 IsClippingValue(v) iff
3     ∃ l, r
4     (1 v = [ → l → r → ] and
5       IsPairOfNnInt1.8(l) and IsPairOfNnInt1.8(r) 1)0)
```

Semiformal Description 7.12

Predicate "is a raster graphics line progression value" (clause 6.1.2)

The value of the attribute 'line progression' is either '90°' or '270°'.

NOTE — Since the attribute 'line progression' is also used within the character content architectures the qualifier "RasterGraphics" has been added to the predicate name.

Definition 7.12

```
1   ∀ v
2   (₀ IsRasterGraphicsLineProgressionValue(v) iff
3     v ∈ ['90°';'270°']₀)
```

Semiformal Description 7.13

Predicate "is a pel path value" (clause 6.1.3)

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

Definition 7.13

```
1   ∀ v
2   (₀ IsPelPathValue(v) iff
3     v ∈ ['0°';'90°';'180°';'270°']₀)
```

Semiformal Description 7.14

Predicate "is a raster graphics initial offset value" (clause 6.2.1)

The value of the attribute 'initial offset' is a nomination with two elements. The names are 'horizontal coordinate' and 'vertical coordinate' and the corresponding components are integers.

NOTE — Since the attribute 'initial offset' is also used within the character content architectures the qualifier "RasterGraphics" has been added to the predicate name.

Definition 7.14

```
1   ∀ v
2   (₀ IsRasterGraphicsInitialOffsetValue(v) iff
3     (₁ IsNeNom^1.2(v) and
4       NAMS^1.18(v) = ['horizontal coordinate';'vertical coordinate'] and
5       ∀ b ∈̂ v • (IsInt(C b)) ₁)₀)
```

Semiformal Description 7.15

Predicate "is a pel transmission density value" (clause 6.2.2)

The value of the attribute pel transmission density is one of '1 BMU', '2 BMU', '3 BMU', '4 BMU', '5 BMU' or '6 BMU'.

Definition 7.15

```
1   ∀ v
2   (₀ IsPelTransmissionDensityValue(v) iff
3     v ∈ ['1 BMU';'2 BMU';'3 BMU';'4 BMU';'5 BMU';'6 BMU']₀)
```

Semiformal Description 7.16

Predicate "is an image dimensions value" (clause 6.3.1)

The value of the attribute 'image dimensions' is a nomination where the name is one of 'width controlled', 'height controlled', 'area controlled' or 'automatic'. For the name 'width controlled' the corresponding component is a non-empty nomination with the names 'minimum width' and 'preferred width' and the associated components are non-negative integers. For the name 'height controlled' the corresponding component is a non-empty nomination with the names 'minimum height' and 'preferred height' and the associated components are non-negative integers. For the name 'area controlled' the corresponding component is a non-empty nomination with the names 'minimum width', 'preferred width', 'minimum height', 'preferred height' (the components are non-negative integers) and 'aspect ratio flag' (the component is either 'fixed' or 'variable'). For the name 'automatic' the component is 'null'.

Definition 7.16

```
1   ∀ v
2   (0 IsImageDimensionsValue(v) iff
3     ∃ n, a
4     (1 v = [n : a] and
5       (2 n = 'width controlled' impl
6         (3 IsNeNom^1.2(a) and
7           NAMS^1.18(a) = ['minimum width'; 'preferred width'] and
8           ∀ b ∈̂ a • (IsNnInt^1.7(C b)) 3)2) and
9       (4 n = 'height controlled' impl
10        (5 IsNeNom^1.2(a) and
11          NAMS^1.18(a) = ['minimum height'; 'preferred height'] and
12          ∀ b ∈̂ a • IsNnInt^1.7(C b) 5)4) and
13      (6 n = 'area controlled' impl
14        (7 IsNeNom^1.2(a) and
15          NAMS^1.18(a) = ['minimum height'; 'preferred height';
16                          'minimum width'; 'preferred width'; 'aspect ratio flag'] and
17          ∀ b ∈̂ a •
18          (8 (9 N b ∈ ['minimum width'; 'preferred width'; 'minimum height'; 'preferred height'] impl
19            IsNnInt^1.7(C b) 9) and
20            (10 N b = 'aspect ratio flag' impl C b ∈ ['fixed'; 'variable'] 10)8)7)6) and
21      (11 n = 'automatic' impl a = 'null' 11)1)0)
```

Semiformal Description 7.17

Predicate "is a pel spacing value" (clause 6.3.2)

The value of the attribute 'pel spacing' is either 'null' or a nomination with two elements. The names are 'length' and 'pel spaces' and the corresponding components are positive integers.

Definition 7.17

```
1   ∀ v
2   (0 IsPelSpacingValue(v) iff
3     (1 (v = 'null') or
4       (2 IsNeNom^1.2(v) and
5         NAMS^1.18(v) = ['length'; 'pel spaces'] and
6         ∀ b ∈̂ v • (IsNat(C b)) 2)1)0)
```

Semiformal Description 7.18

Predicate "is a spacing ratio value" (clause 6.3.3)

The value of the attribute 'spacing ratio' a nomination with two elements. The names are 'line spacing value' and 'pel spacing value' and the corresponding components are positive integers.

Definition 7.18

```
1   ∀ v
2   (₀ IsSpacingRatioValue(v) iff
3     (₁ IsNeNom^1.2(v) and
4       NAMS^1.18(v) = ['line spacing value';'pel spacing value'] and
5       ∀ b ∈̂ ~v • (IsNat(C b)) ₁)₀)
```

Semiformal Description 7.19

Predicate "is a raster graphics content architecture class value" (clause 6.4.1)

The value of the attribute 'content architecture class' is an ASN.1 object identifier with either the value '2 8 2 7 0' or '2 8 2 7 2' for raster graphics content.

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

Definition 7.19

```
1   ∀ v
2   (₀ IsRasterGraphicsContentArchitectureClassValue(v) iff
3     v ∈ ['2 8 2 7 0';'2 8 2 7 2']₀)
```

Semiformal Description 7.20

Predicate "is a raster graphics content type of coding value" (clause 7.1.1)

For a raster graphics content portion the value of the attribute 'type of coding' is either 0 or an ASN.1 object identifier with either the value '2 8 3 7 0', '2 8 3 7 1', '2 8 3 7 2', '2 8 3 7 3' or '2 8 3 7 5'.

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

Definition 7.20

```
1   ∀ v
2   (₀ IsRasterGraphicsContentTypeOfCodingValue(v) iff
3     (₁ v = 0 or v ∈ ['2 8 3 7 0';'2 8 3 7 1';'2 8 3 7 2';'2 8 3 7 3';'2 8 3 7 5']₁)₀)
```

Semiformal Description 7.21

Predicate "is a compression value" (clause 7.2.1)

The value of the attribute 'compression' is either 'compressed' or 'uncompressed'.

Definition 7.21

```
1   ∀ v
2   (₀ IsCompressionValue(v) iff
3     v ∈ ['compressed';'uncompressed']₀)
```

Semiformal Description 7.22

Predicate "is a number of lines value" (clause 7.2.2)

The value of the attribute 'number of lines' is a positive integer.

Definition 7.22

1 $\forall v$
2 $(_{o}$ IsNumberOfLinesValue(v) *iff*
3 IsNat$(v)_{o})$

Semiformal Description 7.23

Predicate "is a number of pels per line value" (clause 7.2.3)

The value of the attribute 'number of pels per line' is a non-negative integer.

Definition 7.23

1 $\forall v$
2 $(_{o}$ IsNumberOfPelsPerLineValue(v) *iff*
3 IsNnInt$^{1.7}(v)_{o})$

Semiformal Description 7.24

Predicate "is a number of discarded pels value" (clause 7.2.4)

The value of the attribute 'number of discarded pels' is a non-negative integer.

Definition 7.24

1 $\forall v$
2 $(_{o}$ IsNumberOfDiscardedPelsValue(v) *iff*
3 IsNnInt$^{1.7}(v)_{o})$

Semiformal Description 7.25

Predicate "is a raster graphics content information value" (clause 7.3.1)

For a raster graphics content portion the value of the attribute 'content information' is an octet string, representing the pel array.

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

Definition 7.25

1 $\forall v$
2 $(_{o}$ IsRasterGraphicsContentInformationValue(v) *iff*
3 IsOctetString$^{1.10}(v)_{o})$

Semiformal Description 7.26

Predicate "is a number of lines per tile value" (clause 7.2.5)

For a raster graphics content portion the value of the attribute 'number of lines per tile' is a positive integer.

Definition 7.26

1 $\forall v$
2 $(_0$ IsNumberOfLinesPerTileValue(v) *iff*
3 IsNat$(v)_0)$

Semiformal Description 7.27

Predicate "is a number of pels per tile line" (clause 7.2.6)

For a raster graphics content portion the value of the attribute 'number of pels per tile line' is a positive integer.

Definition 7.27

1 $\forall v$
2 $(_0$ IsNumberOfPelsPerTileLineValue(v) *iff*
3 IsNat$(v)_0)$

Semiformal Description 7.28

Predicate "is a tiling offset value" (clause 7.2.7)

For a raster graphics content portion the value of the attribute 'tiling offset' is a sequence of two non-negative integers.

Definition 7.28

1 $\forall v$
2 $(_0$ IsTilingOffsetValue(v) *iff*
3 $\exists a, b$ *and*
4 $(_1 v = [\rightarrow a \rightarrow b \rightarrow]$ *and* IsNnInt$^{1.7}(a)$ *and* IsNnInt$^{1.7}(b)$ $_1)_0)$

Semiformal Description 7.29

Predicate "is a tile types value" (clause 7.2.8)

For a raster graphics content portion the value of the attribute 'tile types' is a non-empty catenation of tile encoding values.

Definition 7.29

1 $\forall v$
2 $(_0$ IsTileTypesValue(v) *iff*
3 $(_1$ IsNeCat$^{1.3}(v)$ *and*
4 $\forall a \hat{\in} \hat{}v \bullet$ IsTileEncodingValue$^{7.30}(a)$ $_1)_0)$