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Information technology — Computer graphics — Metafile for the storage and transfer of picture description information —

Part 4: Clear text encoding

Technologies de l'information — Infographie — Métafichier de stockage et de transfert des informations de description d'images —

Partie 4: Codage en clair des textes

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 8632 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 8632-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics and image processing*.

This second edition cancels and replaces the first edition (ISO/IEC 8632-4:1992), which has been technically revised. Note that the previous edition of ISO/IEC 8632-4, published in 1992, was a first edition but second edition was indicated by error on its cover page and in the foreword.

ISO/IEC 8632 consists of the following parts, under the general title *Information technology — Computer graphics — Metafile for the storage and transfer of picture description information*:

— *Part 1: Functional specification*

— *Part 3: Binary encoding*

— *Part 4: Clear text encoding*

Annex A forms a normative part of this part of ISO/IEC 8632. Annex B is for information only.

NOTE In previous editions of ISO/IEC 8632, Part 2 defined a Character Encoding. Part 2 was withdrawn in 1998, due to its lack of implementation and use.

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Introduction

0.1 Purpose of the clear text encoding

The Clear Text Encoding of the Computer Graphics Metafile (CGM) provides a representation of the Metafile syntax that is easy to type, edit and read. It allows a metafile to be edited with any standard text editor, using the internal character code of the host computer system.

0.2 Primary objectives

a) Human editable: The Clear Text Encoding should be able to be hand edited or, if desired, hand constructed.

b) Human friendly: The Clear Text Encoding should be easy and natural for people to read and edit. Although what is easiest and most natural is a subjective judgment that varies among users, contributing factors such as ease of recognition, ease of remembering, avoidance of ambiguity, and prevention of mistyping have all been considered.

c) Machine readable: The Clear Text Encoding should be able to be parsed by software.

d) Suitable for use in a wide variety of editors: The Clear Text Encoding should not have any features that make it difficult to edit in normal text editors.

e) Facilitate interchange between diverse systems: The Clear Text Encoding should be encoded in such a way as to maximize the set of systems which can utilize it. No assumptions should be made as to word size or arithmetic modes used to interpret the metafile.

f) Use standardized abbreviations as much as possible: Where language encoding of other graphics standards have established standard abbreviations, or where common practice in the data processing and graphics industries has established well known abbreviations, these abbreviations are used. In accordance with the principle of “least astonishment”, this approach should minimize the time needed to learn to use this encoding.

0.3 Secondary objectives

Because the other CGM encoding (the CGM Binary Encoding) is targeted toward CPU efficiency and information density, these objectives are considered of secondary importance for the CGM Clear Text Encoding.

0.4 Relationship to other International Standards

The set of characters required to implement the Clear Text Encoding is a subset of those included in national versions of ISO/IEC 646. Any character set that can be mapped to and from that subset may be used to implement the encoding.

For certain elements, the CGM defines value ranges as being reserved for registration. The values and their meanings will be defined using the established procedures (see ISO/IEC 8632-1, 6.12.)

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Information technology — Computer graphics — Metafile for the storage and transfer of picture description information —

Part 4:
Clear text encoding

1 Scope

This part of ISO/IEC 8632 specifies a clear text encoding of the Computer Graphics Metafile. For each of the elements specified in ISO/IEC 8632-1, a clear text encoding is specified. Allowed abbreviations are specified. The overall format of the metafile and the means by which comments may be interspersed in the metafile is specified.

This encoding of the CGM allows metafiles to be created and maintained in a form which is simple to type, easy to edit and convenient to read.

2 Conformance

Conformance of metafiles to ISO/IEC 8632 is defined in terms of profiles. A metafile conforms to this encoding if it conforms to a profile and meets the following criteria:

— Each metafile element described in this part shall be encoded in the manner described in this part of this International Standard and a profile.

— Metafile elements which are not defined in Part 1 or in this encoding are all encoded using the GENERALIZED DRAWING PRIMITIVE or ESCAPE metafile elements as appropriate. According to the profile rules of Part 1 (see clause 9, subclause 9.5.2.8), such elements shall either be profile defined or registered, in order that the profile be valid. Inclusion of private elements is not permissible in a valid profile of ISO/IEC 8632 and this encoding.

— Values of index parameters, which are used as enumeration selectors from lists of implicitly defined attribute values, shall either be standard, registered, or profile defined. The standard and registered values are all non-negative, and the profile-defined shall be negative. Use of private, implicitly-defined negative index values which are not profile defined is not permissible in a valid profile of ISO/IEC 8632 and this encoding.

— Values specified as being "reserved for registered values" shall not be used unless their meaning has been registered or standardized.

— All characters in the metafile shall be from the enumerated character repertoire (see 6.1), except for those within a parameters of type String and String Fixed, eligible parameters within specific data records, and format effectors as described in 6.1.

— Numbers shall be formatted as defined in 6.3.1 and 6.3.2.

— Inclusion of non-graphical data in the metafile shall be accomplished with the APPLICATION DATA element or with the APPLICATION STRUCTURE ATTRIBUTE element.

See clause 9 for additional conformance information about this encoding.

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3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 8632. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 8632 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 646:1991, *Information technology — ISO 7-bit coded character set for information interchange.*

ISO 2022:1986, *Information processing — ISO 7-bit and 8-bit coded character sets — Code extension techniques.*

4 Notational conventions

Unbracketed strings are terminals of this grammar. They appear in valid Clear Text data streams exactly as indicated in the specifications of this part, except for allowable variations on case and null characters described below.

Bracketed strings are either non-terminals (with further productions given), character symbol names (such as COMMA), or parameters of the CGM element in the form <x:y> (see ISO/IEC 8632-1 for further explanation of these items).

"::=" is read as "becomes" or "is realized as".

<...>* = star closure (0 or more occurrences).
<...>+ = plus closure (1 or more occurrences).
<...>o = optional (exactly 0 or 1 occurrences).
<x:y> = parameter type x with meaning y
<x|y> = exactly one of x or y
{...} = a comment (not part of the production)
<...>(n) = exactly n occurrences, n=0,1,2,...

SPACES are used for readability in the grammar description; SPACES in the actual metafile are indicated through the separator productions given below.

The metasymbols used in describing the grammar do not appear in the actual metafile.

5 Entering and leaving the metafile environment

5.1 Generic clear text and instantiations

The Clear Text Encoding is described in a generic fashion that permits it to be used with any character set capable of representing those characters enumerated in the Character Repertoire (see part 1, 6.7.3.2). An instantiation of the Clear Text Encoding is specified by defining the character set and coding technique to be used (for example, standard national character sets based on ISO/IEC 646, non-standard character sets such as EBCDIC, etc).

It is recommended that an instantiation of the Clear Text Encoding bound to the standard national character set based on ISO/IEC 646 be used in order to maximize portability of Clear Text metafiles between diverse systems. This also provides an encoding which can be incorporated into an ISO 2022 text environment as a complete code, to permit intermixing of text and graphics for applications which place a high priority on human readability.

5.2 Implicitly entering the metafile environment

The Clear Text coding environment may be entered implicitly by agreement between the interchanging parties. This is suitable only if there is not to be any interchange with services using other coding techniques, and if it is known by prior agreement which instantiation of the syntax is being used.

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5.3 Designating and invoking the CGM coding environment from ISO 2022

For interchange with services using the code extension techniques of ISO 2022, the (standard national version) ISO/IEC 646 instantiation of the CGM Clear Text Encoding may be designated and invoked from the ISO 2022 environment by the following escape sequence:

ESC 2/5 F

where ESC is the bit combination 1/11, and F refers to a bit combination that will be assigned by the ISO Registration Authority for ISO 2375.

The first bit combination occurring after this escape sequence will then represent the beginning of a CGM metafile element or one of the “soft separators” or “null characters” defined below.

The following escape sequence may be used to return to the ISO 2022 coding environment:

ESC 2/5 4/0

This not only returns to the ISO 2022 coding environment, but also restores the designation and invocation of coded character sets to the state that existed prior to entering the ISO/IEC 646 CGM coding environment with the ESC 2/5 F sequence. (The terms “designation” and “invocation” are defined in ISO 2022.)

It is permissable to make transitions between ISO 2022 and the metafile environment between pictures in the metafile as well as between metafiles.

The state of the metafile interpreter and the state of the ISO 2022 environment are maintained separately and not stacked.

The state of the metafile interpreter before BEGIN METAFILE or after END METAFILE is undefined, and sending a picture without a preceding BEGIN METAFILE and metafile descriptor is nonconforming interchange.

6 Metafile format

A metafile in the Clear Text Encoding consists of a stream of characters forming a series of elements, each of which starts with an element name and ends with one of the element delimiters, either the SLASH character (also known as SLANT or SOLIDUS) or the SEMICOLON character. These characters do not act as element delimiters when occurring within the bounds of a string parameter, as defined below.

6.1 Character repertoire

In order to achieve objective (e) of sub-clause 0.2, the character repertoire of the Clear Text Encoding will be limited to those characters enumerated below, except for string parameters, which may contain any characters from the repertoire described in 4.7.3.2 ISO/IEC 8632-1.

- Upper-case characters:
  "A", "B", "C", "D", "E", "F", "G", "H", "I",
  “J", "K", "L", "M", "N", "O", "P", "Q", "R",
  “S", "T", "U", "V", "W", "X", "Y", "Z"
- Lower-case characters:
  “a", "b", "c", "d", "e", "f", "g", "h", "i",
  “j", "k", "l", "m", "n", "o", "p", "q", "r",
  “s", "t", "u", "v", "w", "x", "y", "z"
- Digits:
  “0", "1", "2", "3", "4", "5", "6", "7", "8", "9"
- " " (SPACE character)
- "+" (PLUS character)
- "-" (MINUS character)
- "#" (NUMBER SIGN)
- ";" (SEMICOLON character)

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- "/" (SLASH, SLANT, or SOLIDUS character)
- "(" (LEFT or OPEN PARENTHESIS character)
- ")" (RIGHT or CLOSE PARENTHESIS character)
- "," (COMMA character)
- "." (DECIMAL POINT or PERIOD character)
- "'" (APOSTROPHE or SINGLE QUOTE character)
- """ (DOUBLE QUOTE character)
- "_" (UNDERSCORE character)
- "$" (DOLLAR SIGN or CURRENCY symbol)
- "%" (PERCENT SIGN character)

Lower-case characters are considered to be the same as upper-case characters, when occurring outside of string parameters. Any combination of lower-case and upper-case characters may be used within an element or enumerated parameter name.

The UNDERSCORE and DOLLAR SIGN symbols are defined as “null characters” within this encoding. They may appear anywhere within the metafile, and are mandated to have no effect on parsing (outside of string parameters). They are available for the generator or editor of the metafile to use in enhancing readability of tokens.

EXAMPLE:

The following are all equivalent:

linetype, LINETYPE, LineType, line_type, $LINETYPE, L_I_N_E$T_Y_P_E;

similarly, the following are all equivalent:

123456, $123456, 123_456, $123_456, $12$34$56.

Those control characters that are format effectors (BACKSPACE, CARRIAGE RETURN, LINEFEED, NEWLINE, HORIZONTAL TAB, VERTICAL TAB, and FORMFEED) are permitted in the metafile, but are treated as SPACE characters (that is, as soft delimiters) by the metafile interpreter whenever they occur outside of string parameters. They may be used to assist in formatting the metafile to improve its readability. The effect of such format effectors within string parameters is as defined in ISO/IEC 8632-1.

A metafile written in the Clear Text Encoding is considered to be non-conforming if it includes characters other than those listed in the repertoire and the format effectors (outside of string parameters). Implementation-dependent extensions which require use of characters other than the above should be embedded in the string parameters of the ESCAPE, MESSAGE, or APPLICATION DATA elements, or in comments.

The code set of the characters is not fixed by this part of ISO/IEC 8632. In order to accomplish the objective of editability, it is permitted to encode the Clear Text Encoding using the character set codes native to the system. It is presumed that standard conversion facilities can be used in translating Clear Text CGM files from one system’s character set codes to another, consistent with the treatment of other text files being transferred between systems. It is recommended that the ISO/IEC 646 codes be used to encode Clear Text metafiles for transport between diverse systems.

Null characters or format effectors outside of text strings which do not exist in the target system’s encoding may be dropped in such translation, and lower-case letters translated to upper case as necessary, without altering the information content of the metafile. Likewise, the two statement delimiter characters are interchangeable and may be changed in such a translation without affecting the information content of the metafile. The two string delimiter characters are interchangeable, but any translation shall correctly handle the possible occurrence of either string delimiter character within the string parameter.

6.2 Separators

6.2.1 Element separators

<TERM> ::= <OPTSEP> <SLASH | SEMICOLON> <OPTSEP>

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The SEMICOLON and SLASH characters may be used interchangeably to delimit elements in a Clear Text metafile. These elements do not, however, terminate an element when they occur within a string parameter, as described below.

The elements of the metafile are not terminated by the ends of records, as indicated by control characters such as CR (carriage return) or LF (linefeed). Multiple elements may exist on one line, and any element may extend over multiple lines.

6.2.2 Parameter separators

The following productions are used in the Clear Text Encoding for parameter separators:

<SEPCHAR> ::= <SPACE | CARRIAGE RETURN | LINEFEED
| HORIZONTAL TAB | VERTICAL TAB | FORMFEED>

<SOFTSEP> ::= <SEPCHAR>+

<OPTSEP> ::= <SEPCHAR>*

<HARDSEP> ::= <OPTSEP> <COMMA> <OPTSEP>

<SEP> ::= <SOFTSEP> | <HARDSEP>

Most commands require a SOFTSEP after the element name (e.g., at least one space). This permits element names to be formed from a mixture of alpha and numeric characters.

The separator between parameters is usually a SEP. This format permits omission of parameters. (Two consecutive COMMAs indicate an omitted parameter.)

Since the enclosing APOSTROPHE or DOUBLE QUOTE character sufficiently delineates string parameters, and the statement delimiter SLASH also sets off the data on either side of it, the separators between these characters and adjacent parameters or element names are optional (OPTSEP).

SEPCHAR characters are not permitted within a name (element or enumerated type), or within the representation of a numeric parameter. Any place where a SEPCHAR is permitted (other than inside a string parameter), an arbitrary number of SEPCHARs may be used.

6.2.3 Comments in the metafile

Comments may be included in a Clear Text metafile, to enhance its readability and usefulness. Some uses of comments might be to document hand-edited changes to the metafile, or as “notes to one’s self” made while reading a metafile. To include other forms of nongraphical information in the metafile, it is suggested that the APPLICATION DATA element be used. If it is desired to convert a Clear Text metafile to one of the other encodings, comments may be either dropped or converted to APPLICATION DATA elements.

Comments are encoded as a series of printing characters and <SEPCHAR>s surrounded by “%” (PERCENT SIGN) characters. The text of the comment may not include this comment delimiter character.

Comments may be included any place that a separator may be used, and are equivalent to a <SOFTSEP>; they may be replaced by a SPACE character in parsing, without affecting the meaning of the metafile.

6.3 Encoding of parameter types

6.3.1 Integer-bound types

Integers, integer coordinates, indexes, names, and the components of direct colour parameters are all bound to signed integers, indicated in the encoding as I.

The data types UI8 and UI32 of ISO/IEC 8632-1 are bound to non-negative values of signed integers, also indicated in this encoding as I.

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<I>	::=	<decimal integer> | <based integer>
<decimal integer>	::=	<sign>o <digit>+
<sign>	::=	<PLUS SIGN> | <MINUS SIGN>
<based integer>	::=	<sign>o <base> <NUMBER SIGN> <extended digit>+
<base>	::=	2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16
<digit>	::=	0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
<extended digit>	::=	<digit> | A | B | C | D | E | F | a | b | c | d | e | f

The null characters are permitted within numbers, but are not shown in the productions for simplicity.

A decimal integer has an optional sign and at least one digit. If the sign appears, it immediately precedes the number with no intervening SPACE (or other <SEPCHAR>) characters allowed.

A based integer has an optional sign, a base (an unsigned integer in the range 2..16 inclusive, represented in base 10), a “#”, and a string of one or more extended digits. If the sign appears, it immediately precedes the number with no intervening SPACE (or other <SEPCHAR>) characters allowed. The extended digits used shall be valid for the base named or the metafile is not conforming; e.g., for base 8 the digits “8”, “9”, etc. are not valid, for base 2 only the digits “0” and “1” are valid, and so forth. Case is not significant for the extended digits.

If the sign is omitted for either form, the number is considered non-negative.

Both the base and the <extended digit>+ are interpreted as unsigned numbers, and the final result negated if a MINUS SIGN preceded the number. No assumptions should be made as to the word size of the metafile interpreter, or whether the underlying arithmetic is one’s complement, two’s complement, or sign-magnitude. For example, -1 would be encoded in hexadecimal as -16#1, -16#0001, etc. rather than 16#FFFF. Of course, metafiles may be created utilizing prior knowledge of the intended target machine, but any such assumptions will limit the portability of the metafile and are discouraged.

EXAMPLE:

0, 007, -5, +123_456

The following are equivalent: 65535, 16#FFFF, 16#ffff, 8#177777, 2#1111_1111_1111_1111

The following are equivalent: -32_768, -16#8000, -8#100000, -2#10000000_00000000

Interpretation of numerically bound parameters will be “free field”, that is, there is an implied radix point to the right of the rightmost digit, and neither leading nor trailing spaces are significant. Leading zeroes are not significant.

6.3.2 Real-bound types

Reals and real coordinates are bound to real numbers, indicated in the encoding as R. These are written as either explicit-point numbers or scaled-real numbers (or decimal integers, where appropriate).

<R>	::=	< explicit-point number > | < scaled-real number> | < decimal integer >
< explicit-point number >	::=	<sign>o <<digit>+ <PERIOD> <digit>*> | <<digit>* <PERIOD> <digit>+> >

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< scaled-real number>	::=	<body> < E | e > <exponent>
<body>	::=	<explicit-point number> | <decimal integer>
<exponent>	::=	<decimal integer>

The interpretation of the scaled-real number is the same as standard scientific notation (similar to FORTRAN “E” format), where the number represented by <body> is multiplied by 10 taken to the power <exponent>.

There shall be at least one digit in an explicit-point number and in the body of a scaled-real number, which in the case of a single-digit number may appear on either side of the radix point. It is recommended but not required that there be at least one digit before the radix point, for numbers with only a fractional part. Zero may be encoded as “0.”, “.0”, “0.0”, “0”, etc., although the second form is not recommended.

In the case of a scaled-real number (one where an “E” or “e” appears), at least one digit shall appear in the <exponent>. No SPACE or other <SEPCHAR> characters are permitted between the <body> and the “E” or “e”, or between the “E” or “e” and the <exponent>.

The interpretation of parameters bound to this data type will be “free field”, that is, if there is an explicit radix point, it sets the radix point of the internal representation, and neither leading nor trailing spaces or zeroes are significant. If the radix point is omitted, it is implied to be at the right of the rightmost digit of the explicit-point number or of the <body> of the scaled-real number. Thus, decimal I-format numbers are permitted to appear in a conforming metafile for parameters bound to real numbers when there is no fractional part.

For real numbers in all formats, the only permitted base of representation is base 10.

If the <sign> (“+” or “-“) is omitted, the number is assumed to be non-negative. If the sign is present, it immediately precedes the body of the number, with no SPACE (or other <SEPCHAR>) characters allowed between it and the leftmost digit or radix point of the body of the number.

COMMA, SPACE and other <SEPCHAR> characters are not permitted within a number, but <NULLCHAR> characters are permitted (and have no effect on parsing).

EXAMPLE:

3.14159

7.853982E-7

271828e-5

42

-.04321 (not recommended form)

-0.043_21

42E2

6.3.3 String-bound types

STRING parameters, both String (S) and String Fixed (SF) types, are represented as character strings immediately surrounded by a matched pair of either APOSTROPHE (SINGLE QUOTE) or DOUBLE QUOTE characters.

If an APOSTROPHE is required in a string delimited with APOSTROPHES, it is represented by two adjacent APOSTROPHES at that position in the string. Likewise, if a DOUBLE QUOTE character is required in a string delimited with DOUBLE QUOTE characters, it is represented by two adjacent DOUBLE QUOTE characters. For example, the following are equivalent

TEXT 0 0 FINAL "Murphy's Law: ""If it can go wrong, it will.""";

TEXT 0 0 FINAL 'Murphy''s Law: "If it can go wrong, it will."';

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DATA RECORD data type is represented as a string in this encoding.

STRING and DATA RECORD parameters are indicated in the element encodings as S. STRING FIXED is indicated in the element encodings as SF.

6.3.4 Enumerated types

Enumerated types are bound to names, similarly to the element names.

6.3.5 Derived types

In addition to the I, R, and S parameter formats, the following abbreviations are used as shorthand for the productions shown.

VDC ::= <I> | <R>
{ coordinate data, depending on VDC TYPE }

<RED GREEN BLUE> ::= <I:RED> <SEP> <I:GREEN> <SEP> <I:BLUE>

<L A B> ::= <I:L><SEP><I:A><SEP><I:B>

<L U V> ::= <I:L><SEP><I:U><SEP><I:V>

<CYAN MAGENTA YELLOW BLACK>
::= <I:CYAN><SEP><I:MAGENTA>
<SEP><I:YELLOW><SEP><I:BLACK>

<A B C> ::= <I:A><SEP><I:B><SEP><I:C><

K ::= <I> | <DIRECTCOLR>
{colour specifier, depending on COLOUR SELECTION MODE}

<DIRECTCOLR> ::= <RED GREEN BLUE> {if COLOUR MODEL is RGB}
| <L A B> {if COLOUR MODEL is CIELAB}
| <L U V> {if COLOUR MODEL is CIELUV}
| <CYAN MAGENTA YELLOW BLACK>
{if COLOUR MODEL is CMYK}
| <A B C> {if COLOUR MODEL is RGB-related}<

POINTREC ::= <VDC> <SEP> <VDC>

P ::= <POINTREC>
| < <LEFT PAREN> <OPTSEP> <POINTREC> <OPTSEP>
<RIGHT PAREN> >

POINT in VDC space. Parentheses are optional. If they are used, they shall group two VDC numbers. The parenthesized form is intended to aid readability of the metafile. If there are not two numbers in each parenthesized group, the metafile is non-conforming.

V ::= <VDC> | <R>

This corresponds to the SS data type of ISO/IEC 8632-1. It is used for line width, marker size, fill interiors, and edge width, as well as some parameters of user line definition. The resolution of this parameter type to VDC or R depends on the corresponding SPECIFICATION MODE element.

See part 1, 7.1.

N ::= <I> {name}

VC ::= <R> | <I> {viewport coordinate data}

The abstract parameter type VC, a single VC value, is either a real or an integer, depending on the declaration of the picture descriptor element DEVICE VIEWPORT SPECIFICATION MODE. When DEVICE VIEWPORT SPECIFICATION MODE is 'fraction of display surface', the value is real.

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When DEVICE VIEWPORT SPECIFICATION MODE is 'millimetres with scale factor' or 'physical device coordinates', the value is integer.

VPOINTREC ::= <VC><SEP><VC>

VP ::= <VPOINTREC>
| < <LEFT PAREN> <OPTSEP> <VPOINTREC> <OPTSEP> <RIGHT PAREN> >

POINT in viewport coordinate space. Parentheses are optional. If they are used, they shall group two real or integer numbers, depending on DEVICE VIEWPORT SPECIFICATION MODE. The parenthesized form is intended to aid readability of the metafile.

TM ::= <<R: a11><SEP><R: a12><SEP>
<R: a21><SEP><R: a22><SEP>
<VDC: a13><SEP><VDC: a23>>

6.3.6 Bitstream datatype

The parameters of type Bitstream, of tile array elements, shall be represented as follows. The bits taken 4 at a time are represented by a single hexidecimal digit in the Clear Text metafile. Null characters, SPACE, and format effector characters may be interspersed in the stream for readability. For example, a space character every 4 digits and a newline every 60 digits would provide well-formatted output. Bitstream datatype is indicated by "B" in the element definitions. If the cell colour precision indicated by the cell colour precision parameter is 2^N - 1, for some integer N greater than 0, then N bits are used to encode the BS parameter. Otherwise the next-largest bit width, N+1, such that 2^N - 1<cell colour precision<2^{N+1} -1, is used to encode the BS parameter.

6.3.7 Structured data record operands

The structured data record (SDR) of part 1 of this International Standard is composed entirely of other standardized datatypes (including SDR itself) in a structure which is self-defining. SDR is encoded by encoding each of the component operands according to the normal encoding rules for its corresponding data type. The string of characters comprising the encoded operands is then delimited, as is an operand of type String in this part, by matching APOSTROPHE or matching QUOTE characters. The fact that SDR can contain operands of type SDR means that the "strings" can be nested. Nested SDR operands shall be delimited by alternating QUOTE and APOSTROPHE delimiters at successive levels of nesting. Adjacent SDR operands at the same level of nesting shall have at least one SEP character separating them. Within any encoded member, there shall be a <SEP> between the 'data type index' and the 'data element count', and there shall be a <SEP> between the 'data element count' and the list of data elements. If the list of data elements contains more than one item, then adjacent items shall have a <SEP> between them.

6.4 Forming names

The approach was taken of selecting abbreviations for words used to name elements and enumeration types in the CGM, and concatenating them in order.

6.4.1 Words deleted

ANNOUNCER	INDICATOR
AREA	NORMALIZED
BUNDLE	REPLACEMENT
CIRCULAR	SELECTION
CURVE	SPECIFICATION
FACTOR	TANGENTIAL

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6.4.2 Words added

INCREMENTAL

6.4.3 Words used unabbreviated

ABSTRACT	FILTER	PICK
ACTION	FINAL	PIE
ALL	FONT	PLUS
ARC	FORCED	POLYBEZIER
ARRAY	FRACTION	POLYGON
AXIS	GKSM	PRIVATE
BASE	GLYPH	REAL
BASIC	HALF	REGION
BEVEL	HATCH	RIGHT
BIT	HEIGHT	ROUND
BITONAL	HOLLOW	SAVE
BODY	INDEX	SCALED
BOTH	INDEXED	SCORE
BOTTOM	INTEGER	SET
BUNDLED	INTERSECTION	SHAPE
CAP	JOIN	SHIELD
CELL	LEFT	SIZE
CHORD	LIMIT	SOLID
CIRCLE	LINE	START
CLIP	LIST	STRING
CLOSE	LOCUS	STROKE
CODING	MARKER	STYLE
COPY	MATRIX	SYMBOL
DATA	MESSAGE	TABLE
DEFAULTS	METRIC	TEXT
DIRECT	MITRE	THEN
DOWN	MODE	TILE
DRAWING	NAME	TRANSPARENCY
EDGE	NEW	TYPE
ELLIPSE	NO	UP
EMPTY	NOT	VALUE
END	OFF	VDC
ESCAPE	OFFSET	VERSION
FIGURE	ON	WIDTH
FILL	OUTPUT	3 (numeral three)
	PATH	

6.4.4 Abbreviations

ABSOLUTE	ABS
ALIGNMENT	ALIGN
ALTERNATE	ALT
APPEND	APND

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APPLICATION	APPL
APPLICATION STRUCTURE	APS
ASPECT SOURCE FLAG(S)	ASF
ATTRIBUTE(S)	ATTR
AUXILIARY	AUX
BACKGROUND	BACK
BEGIN	BEG
CALIBRATION	CALIB
CENTRE	CTR
CHARACTER	CHAR
CLIPPING	CLIP
COLOUR	COLR
COMPOUND	COMPO
CONNECTING	CONN
CONTEXT	CONT
CONTINUATION	CONT
CONTINUOUS	CONT
CONTROL	CTRL
COORDINATE(S)	COORD
DEFINITION	DEF
DESCRIPTION	DESC
DEVICE	DEV
DIRECTORY	DIR
DISPLAY	DISP
DISJOINT	DISJT
EIGHT	8
ELEMENT	ELEM
ELLIPTICAL	ELLIP
EXPANSION	EXPAN
EXTENDED	EXTD
EXTENT	EXT
GENERALIZED	GEN
GENERALIZED DRAWING PRIMITIVE	GDP
GEOMETRIC	GEO
HIGHLIGHTING	HIGHL
HYPERBOLIC	HYPERB
IDENTIFIER	ID
INCREMENTAL	INCR
INDIVIDUAL	INDIV
INHERITANCE	INH
INITIAL	INIT
INTERIOR	INT
INTERPOLATED	INTERP
INVISIBLE	INVIS
LIBRARY	LIB
MAPPING	MAP
MAXIMUM	MAX

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METAFILE	MF
MILLIMETRE	MM
NON-UNIFORM B-SPLINE	NUB
NON-UNIFORM RATIONAL B-SPLINE	NURB
NORMAL	NORM
ORIENTATION	ORI
PARABOLIC	PARAB
PATTERN	PAT
PHYSICAL	PHY
PICTURE	PIC
PLACEMENT	PLACEM
PRESENTATION	PRES
PRIMITIVE(S)	PRIM
PRIORITY	PRI
PROPERTIES	PROP
PROTECTION	PROT
POINT	PT
POLYLINE	LINE
POLYMARKER	MARKER
POLYSYMBOL	SYMBOL
PRECISION	PREC
RECTANGLE	RECT
REFERENCE	REF
REPRESENTATION	REP
RESTORE	RES
RESTRICTED	RESTR
REVERSED	REV
SCALING	SCALE
SEGMENT	SEG
SEVEN	7
SPACING	SPACE
STATELIST	STLIST
TRANSFORMATION	TRAN
TRANSPARENT	TRANSP
TWO	2
VIEWPORT	VP
VISIBILITY	VIS
VISIBLE	VIS

6.4.5 The derived element names

Metafile Element	Element Name	Notes
BEGIN METAFILE	BEGMF	
END METAFILE	ENDMF	
BEGIN PICTURE	BEGPIC	
BEGIN PICTURE BODY	BEGPICBODY	
END PICTURE	ENDPIC	

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BEGIN SEGMENT	BEGSEG	
END SEGMENT	ENDSEG	
BEGIN FIGURE	BEGFIGURE	
END FIGURE	ENDFIGURE	
BEGIN PROTECTION REGION	BEGPROTREGION	
END PROTECTION REGION	ENDPROTREGION	
BEGIN COMPOUND LINE	BEGCOMPOLINE	
END COMPOUND LINE	ENDCOMPOLINE	
BEGIN COMPOUND TEXT PATH	BEGCOMPOTEXTPATH	
END COMPOUND TEXT PATH	ENDCOMPOTEXTPATH	
BEGIN TILE ARRAY	BEGTILEARRAY	
END TILE ARRAY	ENDTILEARRAY	
BEGIN APPLICATION STRUCTURE	BEGAPS	
BEGIN APPLICATION STRUCTURE BODY	BEGAPSBODY	
END APPLICATION STRUCTURE	ENDAPS	
METAFILE VERSION	MFVERSION	
METAFILE DESCRIPTION	MFDESC	
VDC TYPE	VDCTYPE	
INTEGER PRECISION	INTEGERPREC	
REAL PRECISION	REALPREC	
INDEX PRECISION	INDEXPREC	
COLOUR PRECISION	COLRPREC	
COLOUR INDEX PRECISION	COLRINDEXPREC	
MAXIMUM COLOUR INDEX	MAXCOLRINDEX	
COLOUR VALUE EXTENT	COLRVALUEEXT	
METAFILE ELEMENT LIST	MFELEMLIST	
METAFILE DEFAULTS REPLACEMENT	BEGMFDEFAULTS ENDMFDEFAULTS	(1)
FONT LIST	FONTLIST	
CHARACTER SET LIST	CHARSETLIST	
CHARACTER CODING ANNOUNCER	CHARCODING	
NAME PRECISION	NAMEPREC	
MAXIMUM VDC EXTENT	MAXVDCEXT	
SEGMENT PRIORITY EXTENT	SEGPRIEXT	
COLOUR MODEL	COLRMODEL	
COLOUR CALIBRATION	COLRCALIB	
FONT PROPERTIES	FONTPROP	
GLYPH MAPPING	GLYPHMAP	
SYMBOL LIBRARY LIST	SYMBOLLIBLIST	
PICTURE DIRECTORY	PICDIR	
SCALING MODE	SCALEMODE	
COLOUR SELECTION MODE	COLRMODE	
LINE WIDTH SPECIFICATION MODE	LINEWIDTHMODE	
MARKER SIZE SPECIFICATION MODE	MARKERSIZEMODE	
EDGE WIDTH SPECIFICATION MODE	EDGEWIDTHMODE	

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VDC EXTENT	VDCEXT	
BACKGROUND COLOUR	BACKCOLR	
DEVICE VIEWPORT	DEVVP	
DEVICE VIEWPORT SPECIFICATION MODE	DEVVPMODE	
DEVICE VIEWPORT MAPPING	DEVVPMAP	
LINE REPRESENTATION	LINEREP	
MARKER REPRESENTATION	MARKERREP	
TEXT REPRESENTATION	TEXTREP	
FILL REPRESENTATION	FILLREP	
EDGE REPRESENTATION	EDGEREP	
INTERIOR STYLE SPECIFICATION MODE	INTSTYLEMODE	
LINE AND EDGE TYPE DEFINITION	LINEEDGETYPEDEF	
HATCH STYLE DEFINITION	HATCHSTYLEDEF	
GEOMETRIC PATTERN DEFINITION	GEOPATDEF	
APPLICATION STRUCTURE DIRECTORY	APSDIR	
VDC INTEGER PRECISION	VDCINTEGERPREC	
VDC REAL PRECISION	VDCREALPREC	
AUXILIARY COLOUR	AUXCOLR	
TRANSPARENCY	TRANSPARENCY	
CLIP RECTANGLE	CLIPRECT	
CLIP INDICATOR	CLIP	
LINE CLIPPING MODE	LINECLIPMODE	
MARKER CLIPPING MODE	MARKERCLIPMODE	
EDGE CLIPPING MODE	EDGECLIPMODE	
NEW REGION	NEWREGION	
SAVE PRIMITIVE CONTEXT	SAVEPRIMCONT	
RESTORE PRIMITIVE CONTEXT	RESPRIMCONT	
PROTECTION REGION INDICATOR	PROTREGION	
GENERALIZED TEXT PATH MODE	GENTEXTPATHMODE	
MITRE LIMIT	MITRELIMIT	
TRANSPARENT CELL COLOUR	TRANSPCELLCOLR	
POLYLINE	LINE	(2)
	INCRLINE	
DISJOINT POLYLINE	DISJTLINE	(2)
	INCRDISJTLINE	
POLYMARKER	MARKER	(2)
	INCRMARKER	
TEXT	TEXT	
RESTRICTED TEXT	RESTRTEXT	
APPEND TEXT	APNDTEXT	
POLYGON	POLYGON	(2)
	INCRPOLYGON	
POLYGON SET	POLYGONSET	(2)
	INCRPOLYGONSET	
CELL ARRAY	CELLARRAY	

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GENERALIZED DRAWING PRIMITIVE	GDP	
RECTANGLE	RECT	
CIRCLE	CIRCLE	
CIRCULAR ARC 3 POINT	ARC3PT	
CIRCULAR ARC 3 POINT CLOSE	ARC3PTCLOSE	
CIRCULAR ARC CENTRE	ARCCTR	
CIRCULAR ARC CENTRE CLOSE	ARCCTRCLOSE	
ELLIPSE	ELLIPSE	
ELLIPTICAL ARC	ELLIPARC	
ELLIPTICAL ARC CLOSE	ELLIPARCCLOSE	
CIRCULAR ARC CENTRE REVERSED	ARCCTRREV	
CONNECTING EDGE	CONNEDGE	
HYPERBOLIC ARC	HYPERBARC	
PARABOLIC ARC	PARABARC	
NON-UNIFORM B-SPLINE	NUB	
NON-UNIFORM RATIONAL B-SPLINE	NURB	
POLYBEZIER	POLYBEZIER	
POLYSYMBOL	SYMBOL	(2)
	INCRSYMBOL	
BITONAL TILE	BITONALTILE	
TILE	TILE	
LINE BUNDLE INDEX	LINEINDEX	
LINE TYPE	LINETYPE	
LINE WIDTH	LINEWIDTH	
LINE COLOUR	LINECOLR	
MARKER BUNDLE INDEX	MARKERINDEX	
MARKER TYPE	MARKERTYPE	
MARKER SIZE	MARKERSIZE	
MARKER COLOUR	MARKERCOLR	
TEXT BUNDLE INDEX	TEXTINDEX	
TEXT FONT INDEX	TEXTFONTINDEX	
TEXT PRECISION	TEXTPREC	
CHARACTER EXPANSION FACTOR	CHAREXPAN	
CHARACTER SPACING	CHARSPACE	
TEXT COLOUR	TEXTCOLR	
CHARACTER HEIGHT	CHARHEIGHT	
CHARACTER ORIENTATION	CHARORI	
TEXT PATH	TEXTPATH	
TEXT ALIGNMENT	TEXTALIGN	
CHARACTER SET INDEX	CHARSETINDEX	
ALTERNATE CHARACTER SET INDEX	ALTCHARSETINDEX	
FILL BUNDLE INDEX	FILLINDEX	
INTERIOR STYLE	INTSTYLE	
FILL COLOUR	FILLCOLR	
HATCH INDEX	HATCHINDEX	
PATTERN INDEX	PATINDEX	

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EDGE BUNDLE INDEX	EDGEINDEX
EDGE TYPE	EDGETYPE
EDGE WIDTH	EDGEWIDTH
EDGE COLOUR	EDGECOLR
EDGE VISIBILITY	EDGEVIS
FILL REFERENCE POINT	FILLREFPT
PATTERN TABLE	PATTABLE
PATTERN SIZE	PATSIZE
COLOUR TABLE	COLRTABLE
ASPECT SOURCE FLAGS	ASF
PICK IDENTIFIER	PICKID
LINE CAP	LINECAP
LINE JOIN	LINEJOIN
LINE TYPE CONTINUATION	LINETYPECONT
LINE TYPE INITIAL OFFSET	LINETYPEINITOFFSET
TEXT SCORE TYPE	TEXTSCORETYPE
RESTRICTED TEXT TYPE	RESTRTEXTTYPE
INTERPOLATED INTERIOR	INTERPINT
EDGE CAP	EDGECAP
EDGE JOIN	EDGEJOIN
EDGE TYPE CONTINUATION	EDGETYPECONT
EDGE TYPE INITIAL OFFSET	EDGETYPEINITOFFSET
SYMBOL LIBRARY INDEX	SYMBOLLIBINDEX
SYMBOL COLOUR	SYMBOLCOLR
SYMBOL SIZE	SYMBOLSIZE
SYMBOL ORIENTATION	SYMBOLORI
ESCAPE	ESCAPE
MESSAGE	MESSAGE
APPLICATION DATA	APPLDATA
COPY SEGMENT	COPYSEG
INHERITANCE FILTER	INHFILTER
CLIP INHERITANCE	CLIPINH
SEGMENT TRANSFORMATION	SEGTRAN
SEGMENT HIGHLIGHTING	SEGHIGHL
SEGMENT DISPLAY PRIORITY	SEGDISPPRI
SEGMENT PICK PRIORITY	SEGPICKPRI
APPLICATION STRUCTURE ATTRIBUTE	APSATTR

NOTE 1 This element is implemented by a pair of Clear Text element names in the metafile, one to begin defaults replacement and the second to end defaults replacement.

NOTE 2 These elements have point list parameters, the points of which may be represented either with absolute or incremental coordinates. For each of these elements there are two possible Clear Text element names, one corresponding to absolute

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coordinate representation and one to incremental coordinate representation — the element name used shall correspond to the coordinate representation of point list.

7 Encoding the CGM elements

The defaults for the elements are as given in clause 8 of ISO/IEC 8632-1.

This clause specifies some of the constraints on parameter values. The specifications are not exhaustive, for example such constraints as the non-collinearity of text vectors are not stated. All parameter value and other element state constraints of ISO/IEC 8632-1, including those of the formal grammars, shall apply to metafiles encoded according to this part.

All productions given below which do not appear in the table in subclause 6.4.5 are merely “syntactic shorthand” for describing element productions, and may not appear by themselves in the metafile. For example, CELLROW is a handy way to describe a piece of the CELL ARRAY element, and is not a primitive in itself.

7.1 Encoding delimiter elements

BEGIN METAFILE ::= BEGMF
<OPTSEP>
<SF:NAME>
<TERM>

END METAFILE ::= ENDMF <TERM>

BEGIN PICTURE ::= BEGPIC
<OPTSEP>
<SF:PICTURENAME>
<TERM>

BEGIN PICTURE BODY ::= BEGPICBODY <TERM>

END PICTURE ::= ENDPIC <TERM>

BEGIN SEGMENT ::= BEGSEG
<SOFTSEP>
<N:SEGID>
<TERM>

END SEGMENT ::= ENDSEG <TERM>

BEGIN FIGURE ::= BEGFIGURE <TERM>

END FIGURE ::= ENDFIGURE <TERM>

BEGIN PROTECTION REGION ::= BEGPROTREGION
<SOFTSEP>
<I:REGIONINDEX> {positive}
<TERM>

END PROTECTION REGION ::= ENDPROTREGION<TERM>

BEGIN COMPOUND LINE ::= BEGCOMPOLINE<TERM>

END COMPOUND LINE ::= ENDCOMPOLINE<TERM>

BEGIN COMPOUND TEXT PATH ::= BEGCOMPOTEXTPATH<TERM>

END COMPOUND TEXT PATH ::= ENDCOMPOTEXTPATH<TERM>

BEGIN TILE ARRAY ::= <BEGTILEARRAY>
<SOFTSEP>
<P:POSITION>
<SEP>
<0 | 90 | 180 | 270>

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```
                                    <SEP>
                                    <90 | 270>
                                    <SEP>
                                    <I:TILESPERPATH> {positive}
                                    <SEP>
                                    <I:TILESPERLINE> {positive}
                                    <SEP>
                                    <I:CELLSPERTILEPATH> {positive}
                                    <SEP>
                                    <I:CELLSPERTILELINE> {positive}
                                    <SEP>
                                    <R:CELLSPACING> {positive}
                                    <SEP>
                                    <R:LINESPACING> {positive}
                                    <SEP>
                                    <I:PATHOFFSET> {non-negative}
                                    <SEP>
                                    <I:LINEOFFSET> {non-negative}
                                    <SEP>
                                    <I:CELLSPERPATH> {positive}
                                    <SEP>
                                    <I:CELLSPERLINE> {positive}
                                <TERM>

END TILE ARRAY              ::=   ENDTILEARRAY<TERM>

BEGIN APPLICATION STRUCTURE ::=  BEGAPS
                                    <SOFTSEP>
                                    <SF:APSID>
                                    <SEP>
                                    <SF:APSTYPE>
                                    <SEP>
                                    <STLIST | APS>
                                <TERM>

BEGIN APPLICATION STRUCTURE BODY
                            ::=     BEGAPSBODY<TERM>

END APPLICATION STRUCTURE
                            ::=     ENDAPS<TERM>
```

7.2 Encoding metafile descriptor elements

```
METAFILE VERSION            ::=   MFVERSION
                                    <SOFTSEP>
                                    <I:VERSION>
                                       {1=Version 1, 2=Version 2, 3=Version 3, 4=Version 4}
                                <TERM>

METAFILE DESCRIPTION        ::=   MFDESC
                                    <OPTSEP>
                                    <SF:DESCRIPTION>
                                <TERM>

VDC TYPE                    ::=   VDCTYPE
                                    <SOFTSEP>
                                    < INTEGER | REAL >
                                <TERM>

INTEGER PRECISION           ::=   INTEGERPREC
                                    <SOFTSEP>
                                    <I:MININT>
```


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<SEP>
<I:MAXINT>
<TERM>

The most negative and most positive integers (base 10) are given. These parameters are interpreted independently of all precisions currently set.

REAL PRECISION ::= REALPREC
<SOFTSEP>
<R:MINREAL>
<SEP>
<R:MAXREAL>
<SEP>
<I:DIGITS>
<TERM>

The parameters of this element are interpreted independently of all precisions currently set. The MINREAL and MAXREAL are signed real numbers giving the representable range of numbers. The DIGITS parameter gives the minimum number of DECIMAL DIGITS of accuracy assumed, and is of key importance in preventing roundoff error when the incremental forms of output primitives are used.

NOTE 1 This choice of format was patterned after the floating_point_constraint of the Ada programming language.

INDEX PRECISION ::= INDEXPREC
<SOFTSEP>
<I:MININT>
<SEP>
<I:MAXINT>
<TERM>

The most negative and most positive integers (base 10) are given. These parameters are interpreted independently of all precisions currently set.

COLOUR PRECISION ::= COLRPREC
<SOFTSEP>
<I:MAXCOMPONENT>
<TERM>

NOTE 2 Colour direct values are 3*I or 4*I, depending on COLOUR MODEL. COLOUR PRECISION gives a single integer range, 0..MAXCOMPONENT, within which each of the three or four components is contained. The parameters are interpreted independently of any currently set precisions.

COLOUR INDEX PRECISION ::= COLRINDEXPREC
<SOFTSEP>
<I:MAXINT>
<TERM>

The smallest colour index is 0. The most positive integer that may occur in a colour index parameter is given. This parameter is interpreted independently of all precisions currently set. See MAXCOLRINDEX.

MAXIMUM COLOUR INDEX ::= MAXCOLRINDEX
<SOFTSEP>
<I:MAXINDEXVALUE>
<TERM>

The MAXINDEXVALUE shall be less than or equal to the <MAXINT> parameter of COLRINDEXPREC.

COLOUR VALUE EXTENT ::= COLRVALUEEXT
<SOFTSEP>
<RGBCOLRMAP>
|
<LABCOLRMAP>
|

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<LUVCOLRMAP>
|
<CMYKCOLRMAP>
|
<ABCCOLRMAP>
<TERM>

<RGBCOLRMAP> ::= <RED GREEN BLUE:BLACK>
<SEP>
<RED GREEN BLUE:WHITE>

<LABCOLRMAP> ::= <R:COLRSCALE1> <SEP> <R:COLROFFSET1>
<SEP>
<R:COLRSCALE2> <SEP> <R:COLROFFSET2>
<SEP>
<R:COLRSCALE3> <SEP> <R:COLROFFSET3>

<LUVCOLRMAP> ::= <LABCOLRMAP>

<CMYKCOLRMAP> ::= <CYAN MAGENTA YELLOW BLACK:WHITE>
<SEP>
<CYAN MAGENTA YELLOW BLACK:BLACK>

<ABCCOLRMAP> ::= <LABCOLRMAP>

METAFILE ELEMENT LIST ::= MFELEMLIST
<OPTSEP>
<S:ELEMENTNAMES>
<TERM>

The string parameter consists of a list of element names separated by <SEP>. In addition, the words DRAWINGPLUS, DRAWINGSET, VERSION2, EXTDPRIM, VERSION2GKSM, VERSION3, and VERSION4 may be used in this string. See Part 1, 7.3.11 for the rules on which of these codes may be used in which metafile versions, and Part 1, 6.3.2 for the meanings of these pseudo-codes.

METAFILE DEFAULTS REPLACEMENT
::= BEGMFDEFAULTS <TERM>
<ELEMENT>+
ENDMFDEFAULTS <TERM>

Between the two bracketing elements, applicable CGM elements shall use the same format as described elsewhere in this section.

FONT LIST ::= FONTLIST
<OPTSEP>
<SF:FONTNAME>
< <SEP> <SF:FONTNAME> >*
<TERM>

CHARACTER SET LIST ::= CHARSETLIST
<SOFTSEP>
<CHARSETDESIGNATOR>
< <SEP> <CHARSETDESIGNATOR> >*
<TERM>

CHARSETDESIGNATOR ::= < STD94 |
STD96 |
STD94MULTIBYTE |
STD96MULTIBYTE |
COMPLETECODE >
< <OPTSEP> | <HARDSEP> >
<SF:TAIL>

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```
CHARACTER CODING ANNOUNCER
                                ::=     CHARCODING
                                           <SOFTSEP>
                                           < BASIC7BIT |
                                              BASIC8BIT |
                                              EXTD7BIT |
                                              EXTD8BIT >
                                        <TERM>

NAME PRECISION                  ::=     NAMEPREC
                                           <SOFTSEP>
                                           <I:MININT>
                                           <SEP>
                                           <I:MAXINT>
                                        <TERM>

MAXIMUM VDC EXTENT              ::=     MAXVDCEXT
                                           <SOFTSEP>
                                           <P:FIRSTCORNER>
                                           <SEP>
                                           <P:SECONDCORNER>
                                        <TERM>

SEGMENT PRIORITY EXTENT         ::=     SEGPRIEXT
                                           <SOFTSEP>
                                           <I:MINSEGPRI> {non-negative}
                                           <SEP>
                                           <I:MAXSEGPRI> {non-negative}
                                        <TERM>

COLOUR MODEL                    ::=     COLRMODEL
                                           <SOFTSEP>
                                           <I:MODELINDEX>
                                           {1=RGB, 2=CIELAB,
                                           3=CIELUV, 4=CMYK, 5=RGB-related,
                                           >5, reserved for registered values}
                                        <TERM>

COLOUR CALIBRATION              ::=     COLRCALIB
                                           <SOFTSEP>
                                           <I:CALIBSELECTION>
                                              {1=unspecified, 2=reference white only,
                                              3=reference white, matrix1,
                                              4=reference white, matrix1, lookup tables,
                                              5=reference white, matrix1, lookup tables, matrix2,
                                              6=reference white, matrix1, matrix2,
                                              7=lookup tables, matrix2,
                                              8=matrix2,
                                              9=reference white, grid locations + grid values,
                                              >9, reserved for registered values}
                                           <SEP>
                                           <R:XN> <SEP> <R:YN> <SEP> <R:ZN>
                                           <SEP>
                                           <RGBCALIBDATA>
                                           <SEP>
                                           <CMYKCALIBDATA>
                                        <TERM>

<RGBCALIBDATA>                  ::=     <RGBCALIBMATRIX>
                                           <SEP>
                                           <ABCTRANMATRIX>
```

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```
                                    <SEP>
                                    <I:LUTLENGTH> {n>=0}
                                    <RLUTENTRY>(n)
                                    <GLUTENTRY>(n)
                                    <BLUTENTRY>(n)

<RGBCALIBMATRIX>          ::=   <R: XR> <SEP> <R: XG> <SEP> <R: XB> <SEP>
                                    <R: YR> <SEP> <R: YG> <SEP> <R: YB> <SEP>
                                    <R: ZR> <SEP> <R: ZG> <SEP> <R: ZB>

<ABCTRANMATRIX>           ::=   <R: RA> <SEP> <R: RB> <SEP> <R: RC> <SEP>
                                    <R: GA> <SEP> <R: GB> <SEP> <R: GC> <SEP>
                                    <R: BA> <SEP> <R: BB> <SEP> <R: BC>

<RLUTENTRY>               ::=   <SEP> <I:R> <SEP> <I:RPRIME>

<GLUTENTRY>               ::=   <SEP> <I:G> <SEP> <I:GPRIME>

<BLUTENTRY>               ::=   <SEP> <I:B> <SEP> <I:BPRIME>

<CMYKCALIBDATA>           ::=   <I:GRIDTABLELENGTH> {n>=0}
                                    <<SEP> <DIRECTCOLR:CMYKGRIDLOCATION>>(n)
                                    <XYZGRIDLOCATION>(n)

<XYZGRIDLOCATION>         ::=   <SEP> <R:CIEXYZX> <SEP>
                                    <R:CIEXYZY> <SEP> <R:CIEXYZZ>

FONT PROPERTIES           ::=   FONTPROP
                                    <SOFTSEP>
                                    <PROPERTY3TUPLE>
                                    <<SEP> <PROPERTY3TUPLE>>*
                                  <TERM>

<PROPERTY3TUPLE>          ::=   <I:PROPERTYINDICATOR>
                                      {1=font index, 2=standard version,
                                      3=design source, 4=font family, 5=posture,
                                      6=weight, 7=proportionate width,
                                      8=included glyph collections,
                                      9=included glyphs, 10=design size,
                                      11=minimum size, 12=maximum size,
                                      13=design group, 14=structure,
                                      >14, reserved for registered values}
                                    <SEP> <I:PRIORITY>
                                    <SEP> <SDR:PRIORITYVALUERECORD>

<SDR:PRIORITYVALUERECORD>
                                ::=  <<SEP><I: i_IX><SEP><I: 1><SEP><I: FONTINDEX>>
                                | <<SEP><I: i_I><SEP><I: 1><SEP><I:STANDARDVERSION>>
                                | <<SEP><I: i_SF><SEP><I: 1><OPTSEP><SF:DESIGNSOURCE>>|
                                | <SEP><I: i_SF><SEP><I: 1><OPTSEP><SF:FONTFAMILY>>
                                | <<SEP><I: i_IX><SEP><I: 1><SEP><I:POSTURE>>
                                | <<SEP><I: i_IX><SEP><I: 1><SEP><I:WEIGHT>>
                                | <<SEP><I: i_IX><SEP><I: 1><SEP><I:PROPORTIONATEWIDTH>>
                                | <<SEP><I: i_IX><SEP><I: n><SEP><INCLUDGLYPHCOLLECT>(n)>
                                | <<SEP><I: i_UI32><SEP><I: m><SEP><INCLUDGLYPHS>(m)>
                                | <<SEP><I: i_R><SEP><I: 1><SEP><R:DESIGNSIZE>>
                                | <<SEP><I: i_R><SEP><I: 1><SEP><R:MINIMUMSIZE>>
                                | <<SEP><I: i_R><SEP><I: 1><SEP><R:MAXIMUMSIZE>>
                                | <<SEP><I: i_UI8><SEP><I: 3><SEP><DESIGNGROUP>>
                                | <<SEP><I: i_IX><SEP><I: 1><SEP><I:STRUCTURE>>
```


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NOTE 3 i_XX in the above denotes the integer value of the 'data type designator' for data type “XX” as assigned in annex C of ISO/IEC 8632-1. For example i_IX represents the designator for data type IX, which is assigned the value 11.

See 6.3.7 for complete SDR delimiting and formatting requirements.

<I:FONTINDEX> {positive}

<I:STANDARDVERSION> {positive}

<I:POSTURE>

{0=not applicable, 1=upright,
2=oblique, 3=back slanted oblique,
4=italic, 5=back slanted italic, 6=other,
>6 reserved for registered values}

<I:WEIGHT>

{0=not applicable, 1=ultra light,
2=extra light, 3=light,
4=semi light, 5=medium,
6=semi bold, 7=bold,
8=extra bold, 9= ultra bold,
>9 reserved for registered values}

<I:PROPORTIONATEWIDTH>

{0=not applicable, 1=ultra condensed,
2=extra condensed, 3=condensed,
4=semi condensed, 5=medium,
6=semi expanded, 7=expanded,
8=extra expanded, 9=ultra expanded,
>9 reserved for registered values}

<INCLUDGLYPHCOLLECT> ::= <I:CHARSETINDEX> {positive}

<INCLUDGLYPH> ::= <I:AFII32BITIDENTIFIER>

<R:DESIGNSIZE> {positive}

<R:MINIMUMSIZE> {positive}

<R:MAXIMUMSIZE> {positive}

<I:STRUCTURE>

{0=undefined or not applicable,
1=solid, 2=outline,
>2 reserved for registered values}

<DESIGNGROUP> ::= <I:CLASS> <SEP> <I:SUBCLASS>
<SEP> <I:SPECIFICGROUP>

GLYPH MAPPING ::= GLYPHMAP
<SOFTSEP>
<I:CHARSETINDEX> {positive}
<SEP>
<BASISSET>
<SEP>
<I:OCTETSPERCODE> {this defines m>0}
<SEP>
<I:GLYPHSOURCE>
{1=afii registry of 4-byte identifiers,
>1 reserved for registered values}
<SEP>
<SDR:CODEGLYPHASSOCIATION>
<TERM>

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```
<BASISSET>                          ::=  <CHARSETDESIGNATOR>
                                           {see CHARACTER SET LIST}

<SDR:CODEGLYPHASSOCIATION>          ::=  <
                                           <I:i_UI8><SEP><I:2n>
                                           < <SEP><I:RUNCOUNT><SEP><I:CODE> >(n)
                                         >
                                         <SEP>
                                         <
                                           <I:i_UI32><SEP><I:n>
                                           < <SEP><I:AFII32BITIDENTIFIER> >(n)
                                         >
```

NOTE 4 i_UI8 and i_UI32 in the above respectively denote the integer value of the 'data type designator' for data type UI8 and UI32 as assigned in annex C of ISO/IEC 8632-1.

NOTE 5 The code and glyphname lists are encoded in a runlength form. The runlength syntax in the code list is explicit: each entry is of the form (N, CODE), N=1..255. If N=1, then only the single specified code is defined. If N>1, then a sequence of codes is defined. The base code of the sequence is the explicitly specified one, and each successive code is 1 greater than the previous pair. N is the number of codes in the sequence, and is limited to 255 per sequence (for uniformity of results across encodings). The list of glyph names is parallel to the code list. The glyph names are associated with the corresponding codes, and when there is a run longer than 1 in the codes, there is also a run longer than 1 in the glyph names. Each glyph name in a run is 1 greater than its predecessor.

NOTE 6 See 6.3.7 for complete SDR delimiting and formatting requirements.

NOTE 7 The first (enumerated) parameter selects the location data type ([ldt]) for the subsequent PICLOCATION and APSDIRLOCATION parameters. These are integer-bound parameters, and the [ldt] selects one of three unsigned integer precisions. The values of PICLOCATION are the offsets measured in characters from the first character of the metafile to the first character of the associated BEGIN PICTURE element. The values of APSDIRLOCATION are the offsets measured in characters from the start of the metafile to the first character of the APPLICATION STRUCTURE DIRECTORY element of the associated picture. For the purpose of measuring offsets, a character is a generic unit as defined in subclause 5.1. For string parameters, a character represents a single byte, regardless of the ISO 2022 coding environment in effect for the string parameter (See 6.7.3.2 ISO/IEC 8632-1:1992).

NOTE 8 Editing of clear-text encoded Version 4 metafiles may invalidate PICLOCATION and APSDIRLOCATION values. If so, these values must be recomputed. Also, translation of clear text metafiles between computing environments may invalidate PICLOCATION and APSDIRLOCATION values as different environments represent line endings differenly."

```
SYMBOL LIBRARY LIST                 ::=  SYMBOLLIBLIST
                                           <OPTSEP>
                                           <SF:SYMBOLNAME>
                                           <<SEP><SF:SYMBOLNAME>>*
                                         <TERM>

PICTURE DIRECTORY                   ::=  PICDIR
                                           <SOFTSEP>
                                           <UI8 | UI16 | UI32>
                                           <<SEP><PICDIRTRIPLE>>+
                                         <TERM>

PICDIRTRIPLE                        ::=  <SF:PICID>
                                           <SEP>
                                           <I:PICLOCATION>
                                           <SEP>
                                           <I:APSDIRLOCATION>
```

NOTE 9 The first (enumerated) parameter selects the location data type ([ldt]) for the subsequent PICLOCATION and APSDIRLOCATION parameters. These are integer-bound parameters, and the [ldt] selects one of three unsigned integer precisions. The values of PICLOCATION are the offsets measured in characters from the first character of the metafile to the first character of the associated BEGIN PICTURE element. The values of APSDIRLOCATION are the offsets measured in characters from the start of the metafile to the first character of the APPLICATION STRUCTURE DIRECTORY element of the associated picture. For the purpose of measuring offsets, a character is a generic unit as defined in Subclause 5.1. For string parameters, a character represents a single byte, regardless of the ISO 2022 coding environment in effect for the string parameter (See 6.7.3.2 ISO/IEC 8632-1:1992).

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NOTE 10 Editing of clear-text encoded Version 4 metafiles may invalidate PICLOCATION and APSDIRLOCATION values. If so, these values must be recomputed. Also, translation of clear text metafiles between computing environments may invalidate PICLOCATION and APSDIRLOCATION values as different environments represent line endings differenly.

7.3 Encoding picture descriptor elements

SCALING MODE ::= SCALEMODE
<SOFTSEP>
< ABSTRACT | METRIC >
<SEP>
<R:SCALEFACTOR>
<TERM>

COLOUR SELECTION MODE ::= COLRMODE
<SOFTSEP>
< INDEXED | DIRECT >
<TERM>

LINE WIDTH SPECIFICATION MODE: ::= LINEWIDTHMODE
<SOFTSEP>
<ABS | SCALED | FRACTIONAL | MM>
<TERM>

MARKER SIZE SPECIFICATION MODE
::= MARKERSIZEMODE
<SOFTSEP>
<ABS | SCALED | FRACTIONAL | MM>
<TERM>

EDGE WIDTH SPECIFICATION MODE
::= EDGEWIDTHMODE
<SOFTSEP>
<ABS | SCALED | FRACTIONAL | MM>
<TERM>

VDC EXTENT ::= VDCEXT
<SOFTSEP>
<P:FIRSTCORNER>
<SEP>
<P:SECONDCORNER>
<TERM>

BACKGROUND COLOUR ::= BACKCOLR
<SOFTSEP>
<DIRECTCOLR>
<TERM>

DEVICE VIEWPORT ::= DEVVP
<SOFTSEP>
<VP:FIRSTCORNER>
<SEP>
<VP:SECONDCORNER>
<TERM>

DEVICE VIEWPORT SPECIFICATION MODE
::= DEVVPMODE
<SOFTSEP>
<FRACTION | MM | PHYDEVCOORD>
<SEP>
<R:SCALEFACTOR>
<TERM>

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DEVICE VIEWPORT MAPPING ::= DEVVPMAP
<SOFTSEP>
<NOTFORCED|FORCED>
<SEP>
<LEFT | CTR | RIGHT>
<SEP>
<BOTTOM | CTR | TOP>
<TERM>

LINE REPRESENTATION ::= LINEREP
<SOFTSEP>
<I:BUNDLEINDEX> {positive}
<SEP>
<I:LINETYPE>
{1=solid, 2=dash
3=dot, 4=dash-dot
5=dash-dot-dot
>5=reserved for registered values
<0 private line types}
<SEP>
<V:LINEWIDTH> {non-negative}
<SEP>
<K:LINECOLR>
<TERM>

MARKER REPRESENTATION ::= MARKERREP
<SOFTSEP>
<I:BUNDLEINDEX> {positive}
<SEP>
<I:MARKERTYPE>
{1=dot, 2=plus
3=asterisk, 4=circle
5=cross
>5=reserved for registered values
<0 private marker types}
<SEP>
<V:MARKERSIZE> {non-negative}
<SEP>
<K:MARKERCOLR>
<TERM>

TEXT REPRESENTATION ::= TEXTREP
<SOFTSEP>
<I:BUNDLEINDEX> {positive}
<SEP>
<I:FONTINDEX> {positive}
<SEP>
<STRING|CHAR|STROKE>
<SEP>
<R:SPACING>
<SEP>
<R:FACTOR> {non-negative}
<SEP>
<K:TEXTCOLR>
<TERM>

FILL REPRESENTATION ::= FILLREP
<SOFTSEP>
<I:BUNDLEINDEX> {positive}
<SEP>

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```
                                    <HOLLOW | SOLID | PAT | HATCH | EMPTY |
                                     GEOPAT | INTERP>
                                    <SEP>
                                    <K:FILLCOLR>
                                    <SEP>
                                    <I:HATCHINDEX>
                                       {1=horizontal,2=vertical
                                       3=positive slope
                                       4=negative slope
                                       5=horizontal/vertical cross
                                       6=positive/negative slope cross
                                       >6=reserved for registered values
                                       <0 private hatch styles}
                                    <SEP>
                                    <I:PATINDEX> {positive}
                                 <TERM>

EDGE REPRESENTATION          ::=  EDGEREP
                                    <SOFTSEP>
                                    <I:BUNDLEINDEX> {positive}
                                    <SEP>
                                    <I:EDGETYPE>
                                       {1=solid, 2=dash
                                       3=dot, 4=dash-dot
                                       5=dash-dot-dot
                                       >5=reserved for registered values
                                       <0 private edge types}
                                    <SEP>
                                    <V:EDGEWIDTH>  {non-negative}
                                    <SEP>
                                    <K:EDGECOLR>
                                 <TERM>

INTERIOR STYLE SPECIFICATION MODE
                             ::=    INTSTYLEMODE
                                    <SOFTSEP>
                                    <ABS | SCALED | FRACTIONAL | MM>
                                 <TERM>

LINE AND EDGE TYPE DEFINITION ::=  LINEEDGETYPEDEF
                                    <SOFTSEP>
                                    <I:LINETYPE> {negative}
                                    <SEP>
                                    <V:REPEATLENGTH>
                                    <SEP> <I:DASHELEMENT> {non-negative}
                                    <<SEP> <I:DASHELEMENT>>* {non-negative}
                                 <TERM>

HATCH STYLE DEFINITION       ::=  HATCHSTYLEDEF
                                    <SOFTSEP>
                                    <I:HATCHINDEX> {negative}
                                    <SEP>
                                    <PARALLEL | CROSSHATCH>
                                    <SEP>
                                    <V:FIRSTDIRX>
                                    <SEP>
                                    <V:FIRSTDIRY>
                                    <SEP>
                                    <V:SECONDDIRX>
                                    <SEP>
```

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```
                                    <V:SECONDDIRY>
                                    <SEP>
                                    <V:DUTYCYCLE>
                                    <SEP>
                                    <I:NUMBEROFLINES>  {positive, this defines n}
                                    <<SEP> <I:GAPWIDTH>>(n) {positive}
                                    <<SEP> <I:LINETYPE>>(n)
                                <TERM>

GEOMETRIC PATTERN DEFINITION::= GEOPATDEF
                                    <SOFTSEP>
                                    <I:GEOPATINDEX> {positive}
                                    <SEP>
                                    <N:SEGID>
                                    <SEP>
                                    <P:FIRSTPOINT>
                                    <SEP>
                                    <P:SECONDPOINT>
                                <TERM>

APPLICATION STRUCTURE DIRECTORY
                                ::=   APSDIR
                                    <SOFTSEP>
                                    <UI8 | UI16 | UI32>
                                    <<SEP><APSDIRPAIR>>+
                                <TERM>

APSDIRPAIR                      ::= <SF:APSID>
                                    <SEP>
                                    <I:APSLOCATION>
```

NOTE 11 The first (enumerated) parameter selects the location data type ([ldt]) for the subsequent APSLOCATION parameter. This is an integer-bound parameter, and the [ldt] selects one of three unsigned integer precisions. The values of APSLOCATION are the offsets measured in characters from the first character of the BEGIN PICTURE element containing the APS to the first character of the associated BEGIN APPLICATION STRUCTURE element.

NOTE 12 Editing of clear text encoded Version 4 metafiles may invalidate APSLOCATION values. If so, these values must be recomputed.

7.4 Encoding control elements

```
VDC INTEGER PRECISION           ::= VDCINTEGERPREC
                                    <SOFTSEP>
                                    <I:MININT>
                                    <SEP>
                                    <I:MAXINT>
                                <TERM>
```

See INTEGERPREC for description of the parameters.

```
VDC REAL PRECISION              ::= VDCREALPREC
                                    <SOFTSEP>
                                    <R:MINREAL>
                                    <SEP>
                                    <R:MAXREAL>
                                    <SEP>
                                    <I:DIGITS>
                                <TERM>
```

See REALPREC for description of the parameters.

```
AUXILIARY COLOUR                ::= AUXCOLR
```


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```
                                    <SOFTSEP>
                                    <K:AUXCOLR>
                                <TERM>

TRANSPARENCY                ::= TRANSPARENCY
                                    <SOFTSEP>
                                    < OFF | ON >
                                <TERM>

CLIP RECTANGLE              ::= CLIPRECT
                                    <SOFTSEP>
                                    <P:FIRSTCORNER>
                                    <SEP>
                                    <P:SECONDCORNER>
                                <TERM>

CLIP INDICATOR              ::= CLIP
                                    <SOFTSEP>
                                    < OFF | ON >
                                <TERM>

LINE CLIPPING MODE          ::= LINECLIPMODE
                                    <SOFTSEP>
                                    <LOCUS|SHAPE|LOCUSTHENSHAPE>
                                <TERM>

MARKER CLIPPING MODE        ::= MARKERCLIPMODE
                                    <SOFTSEP>
                                    <LOCUS|SHAPE|LOCUSTHENSHAPE>
                                <TERM>

EDGE CLIPPING MODE          ::= EDGECLIPMODE
                                    <SOFTSEP>
                                    <LOCUS|SHAPE|LOCUSTHENSHAPE>
                                <TERM>

NEW REGION                  ::= NEWREGION
                                    <TERM>

SAVE PRIMITIVE CONTEXT      ::= SAVEPRIMCONT
                                    <SOFTSEP>
                                    <I:CONTEXTNAME>
                                <TERM>

RESTORE PRIMITIVE CONTEXT   ::= RESPRIMCONT
                                    <SOFTSEP>
                                    <I:CONTEXTNAME>
                                <TERM>

PROTECTION REGION INDICATOR ::= PROTREGION
                                    <SOFTSEP>
                                    <I:REGIONINDEX> {positive}
                                    <SEP>
                                    <I:REGIONINDICATOR>
                                       {1=off, 2=clip, 3=shield}
                                <TERM>

GENERALIZED TEXT PATH MODE  ::= GENTEXTPATHMODE
                                    <SOFTSEP>
                                    <OFF | NONAXIS | AXIS>
                                <TERM>
```

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```
MITRE LIMIT                 ::=  MITRELIMIT
                                     <SOFTSEP>
                                     <R:MITRELIMIT> {non-negative}
                                 <TERM>

TRANSPARENT CELL COLOUR     ::=  TRANSPCELLCOLR
                                     <SOFTSEP>
                                     <OFF | ON>
                                     <SEP>
                                     <K:TRANSPCELLCOLOUR>
                                 <TERM>
```

7.5 Encoding graphical primitive elements

```
POLYLINE                    ::=  < LINE
                                     <POINTLIST>
                                     <TERM>
                                 >
                                 |
                                 < INCRLINE
                                     <INCRPOINTLIST>
                                     <TERM>
                                 >
```

LINE and INCRLINE shall always have at least two points.

```
POINTLIST                   ::=  <SOFTSEP>
                                 <P:POINT>
                                 < <SEP> <P:POINT> >+
INCRPOINTLIST               ::=  <SOFTSEP>
                                 <P:FIRSTPOINT>
                                 <DELTA>+

DELTA                       ::=  < <SEP> <DELTAPAIR> > |
                                 < <SEP> <LEFT PAREN> <DELTAPAIR> <RIGHT PAREN> >

DELTAPAIR                   ::=  <OPTSEP>
                                 <VDC:DELTAX>
                                 <SEP>
                                 <VDC:DELTAY>
                                 <OPTSEP>
```

NOTE 1 Absolute coordinates correspond in a straightforward way to the functionality definition, but incremental coordinates can realize a significant savings in this encoding. Even more important, incremental coordinates are high on the priority list for user-friendly graphics, which is a high priority objective of this encoding.

```
DISJOINT POLYLINE           ::=  < DISJTLINE
                                     <SOFTSEP>
                                     <P:POINT>
                                     <SEP>
                                     <P:POINT> >
                                     < <SEP>
                                         <P:POINT>
                                         <SEP>
                                         <P:POINT> >*
                                     <TERM>
                                     >
                                     |
                                     < INCRDISJTLINE
                                     <SOFTSEP>
                                     <P:POINT>
                                     <DELTA>
```


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```
                                    < <DELTA> <DELTA> >*
                                    <TERM>
                                >
```

DISJTLINE and INCRDISJTLINE shall have pairs of points, and at least one pair.

```
POLYMARKER              ::=  < MARKER
                                    <SOFTSEP>
                                    <P:POINT>
                                    <<SEP><P:POINT>>*
                                    <TERM>
                                >
                                |
                                < INCRMARKER
                                    <SOFTSEP>
                                    <P:FIRSTPOINT>
                                    <DELTA>*
                                    <TERM>
                                >

TEXT                    ::=  TEXT
                                    <SOFTSEP>
                                    <P:TEXTLOCATION>
                                    <SEP>
                                    <TEXTPIECE>

RESTRICTED TEXT         ::=  RESTRTEXT
                                    <SOFTSEP>
                                    <VDC:MAXWIDTH>  {non-negative}
                                    <SEP>
                                    <VDC:MAXHEIGHT>  {non-negative}
                                    <SEP>
                                    <P:TEXTLOCATION>
                                    <SEP>
                                    <TEXTPIECE>

APPEND TEXT             ::=  APNDTEXT
                                    <SOFTSEP>
                                    <TEXTPIECE>

TEXTPIECE               ::=  < NOTFINAL | FINAL >
                                    < <OPTSEP> | <HARDSEP> >
                                    <S:TEXTSTRING>
                                <TERM>

POLYGON                 ::=   < POLYGON
                                    <SOFTSEP>
                                    <P:POINT>
                                    <SEP>
                                    <P:POINT>
                                    < <SEP> <P:POINT> >+
                                    TERM>
                                >
                                |
                                < INCRPOLYGON
                                    <SOFTSEP>
                                    <P:POINT>
                                    <DELTA>
                                    <DELTA>+
                                    <TERM>
                                >
```

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```
POLYGON SET          ::=  < POLYGONSET
                              <SOFTSEP>
                              <FLAGGEDPOINT>
                              <SEP>
                              <FLAGGEDPOINT>
                              < <SEP> <FLAGGEDPOINT> >+
                              <TERM>
                          >

                          |

                          < INCRPOLYGONSET
                              <SOFTSEP>
                              <FLAGGEDPOINT>
                              < <FLAGGEDDELTA> <SEP> >+
                              <FLAGGEDDELTA>
                              <TERM>
                          >
```

For all POLYGON-type primitives, at least three points shall be present.

```
EDGEFLAG             ::=  INVIS | VIS | CLOSEINVIS | CLOSEVIS

FLAGGEDPOINT         ::=  <P:VERTEX> <SEP> <EDGEFLAG>

FLAGGEDDELTA         ::=  <DELTA> <SEP> <EDGEFLAG>

CELL ARRAY           ::=  CELLARRAY
                              <SOFTSEP>
                              <P:P_POINT>
                              <SEP>
                              <P:Q_POINT>
                              <SEP>
                              <P:R_POINT>
                              <SEP>
                              <I:NX> {positive}
                              <SEP>
                              <I:NY> {positive}
                              <LOCLCOLRPREC>
                              <CELLROW>+
                          <TERM>

LOCLCOLRPREC         ::=  < <SEP> <I:MAXINT> >   |
                              < <SEP> <I:MAXCOMPONENT>  >  |
                              < <SEP> <I:0>  >
```

The LOCLCOLRPREC takes the form of COLRINDEXPREC or COLRPREC, depending on whether the COLRMODE is <INDEXED> or <DIRECT>, respectively. The value 0 is the 'default precision indicator', and denotes that the precision currently in effect shall be used.

```
CELLROW              ::=  < <SEP> <CELLLIST> > |
                          < <SEP> <LEFT PAREN>
                          <CELLLIST> <RIGHT PAREN> >

CELLLIST             ::=  <K:CELL> < <SEP> <K:CELL> >*
```

The parenthesized form of the list is optional. If parentheses are used, they delimit a row of cells. Each row is considered to start from the side defined by the points (P,Q,R) as defined in ISO/IEC 8632-1. The number of cells between parentheses shall be less than or equal to the row length. If a row is not complete, then the last defined cell in the row is replicated to fill the row.

The local colour precision parameter, LOCLCOLRPREC, takes the form of the parameter of a colour-precision-setting element, either of COLRPREC or of COLRINDEXPREC, depending on the COLRMODE. Legal values are either legal values of one of those colour precision elements, or zero. If the value is zero,

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then the metafile's COLRPREC or COLRINDEXPREC is to be used within the CELLARRAY element as well.

```
GENERALIZED DRAWING PRIMITIVE   ::=  GDP
                                     <SOFTSEP>
                                     <I:GDP_IDENTIFIER>
                                     <<SEP><P:POINT>>*
                                     < <OPTSEP> | <HARDSEP> >
                                     <S:DATARECORD>
                                    <TERM>

RECTANGLE                       ::=  RECT
                                     <SOFTSEP>
                                     <P:FIRSTCORNER>
                                     <SEP>
                                     <P:SECONDCORNER>
                                    <TERM>

CIRCLE                          ::=   CIRCLE
                                     <SOFTSEP>
                                     <P:CENTRE>
                                     <SEP>
                                     <VDC:RADIUS>  {non-negative}
                                    <TERM>

CIRCULAR ARC 3 POINT            ::=  ARC3PT
                                     <3PTARCSPEC>
                                    <TERM>

CIRCULAR ARC 3 POINT CLOSE      ::=  ARC3PTCLOSE
                                     <3PTARCSPEC>
                                     <CLOSESPEC>
                                    <TERM>

CLOSESPEC                       ::=  <SEP>
                                     < PIE | CHORD >
3PTARCSPEC                      ::=  <SOFTSEP>
                                     <P:STARTPOINT>
                                     <SEP>
                                     <P:INTERMEDIATEPOINT>
                                     <SEP>
                                     <P:ENDPOINT>

CIRCULAR ARC CENTRE             ::=  ARCCTR
                                     <CTRARCSPEC>
                                    <TERM>

CIRCULAR ARC CENTRE CLOSE       ::=  ARCCTRCLOSE
                                     <CTRARCSPEC>
                                     <CLOSESPEC>
                                    <TERM>

CTRARCSPEC                      ::=  <SOFTSEP>
                                    <P:CENTREPOINT>
                                    <ARCBOUNDS>
                                    <SEP>
                                    <VDC:RADIUS>  {non-negative}

ARCBOUNDS                       ::=  <SEP>
                                    <P:STARTVECTOR>
                                    <SEP>
                                    <P:ENDVECTOR>
```

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NOTE 2 The start and end vectors are given as point records rather than 2*VDC to permit the parenthesized form to be used to represent the vectors.

ELLIPSE ::= ELLIPSE
<ELLIPSESPEC>
<TERM>

ELLIPSESPEC ::= <SOFTSEP>
<P:CENTRE>
<SEP>
<P:ENDPOINT_FIRST_CONJUGATE_DIAMETER>
<SEP>
<P:ENDPOINT_SECOND_CONJUGATE_DIAMETER>

ELLIPTICAL ARC ::= ELLIPARC
<ELLIPSESPEC>
<ARCBOUNDS>
<TERM>

ELLIPTICAL ARC CLOSE ::= ELLIPARCCLOSE
<ELLIPSESPEC>
<ARCBOUNDS>
<CLOSESPEC>
<TERM>

CIRCULAR ARC CENTRE REVERSED ::= ARCCTRREV
<CTRARCSPEC>
<TERM>

CONNECTING EDGE ::= CONNEDGE
<TERM>

HYPERBOLIC ARC ::= HYPERBARC
<SOFTSEP>
<P:CENTREPOINT>
<SEP>
<P:TRANSVERSPOINT>
<SEP>
<P:CONJUGATEPOINT>
<SEP>
<VDC:STARTX>
<SEP>
<VDC:STARTY>
<SEP>
<VDC:ENDX>
<SEP>
<VDC:ENDY>
<TERM>

PARABOLIC ARC ::= PARABARC
<SOFTSEP>
<P:TANGENTPOINT>
<SEP>
<P:STARTPOINT>
<SEP>
<P:ENDPOINT>
<TERM>

NON-UNIFORM B-SPLINE ::= NUB
<SOFTSEP>
<I:SPLINEORDER> {m}
<SEP>

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```
                                    <I:NUMBERCONTROLPOINTS> {n>=m}
                                    <<SEP> <P:CONTROLPOINT>>(n)
                                    <<SEP> <R:KNOT>>(m+n)
                                    <SEP>
                                    <R:STARTVALUE>
                                    <SEP>
                                    <R:ENDVALUE>
                                <TERM>

NON-UNIFORM RATIONAL B-SPLINE   ::= NURB
                                    <SOFTSEP>
                                    <I:SPLINEORDER> {m}
                                    <SEP>
                                    <I:NUMBERCONTROLPOINTS> {n>=m}
                                    <<SEP> <P:CONTROLPOINT>>(n)
                                    <<SEP> <R:KNOT>>(m+n)
                                    <SEP>
                                    <R:STARTVALUE>
                                    <SEP>
                                    <R:ENDVALUE>
                                    <<SEP> <R:WEIGHT>>(n)
                                <TERM>

POLYBEZIER                      ::= POLYBEZIER
                                    <SOFTSEP>
                                    <I:CONTINUITYINDICATOR>
                                       {1=discontinuous, 2=continuous,
                                       >2, reserved for registered values}
                                    <<SEP> <P:CONTROLPOINT>>(n) {n>=4}
                                <TERM>

POLYSYMBOL                      ::= < SYMBOL
                                    <SOFTSEP>
                                    <I:INDEX>
                                    <SEP>
                                    <P:POINT>
                                    <<SEP><P:POINT>>*
                                    <TERM>
                                >
                                | < INCRSYMBOL
                                    <SOFTSEP>
                                    <I:INDEX>
                                    <SEP>
                                    <P:FIRSTPOINT>
                                    <DELTA>*
                                    <TERM>
                                >
BITONAL TILE                    ::= BITONALTILE
                                    <SOFTSEP>
                                    <I:CMPRSNTYPE>
                                       {0=null background,  1=null foreground,
                                       2=T6, 3=T4 1-dimensional, 4=T4 2-dimensional,
                                       5=bitmap, 6=run length,
                                       >6, reserved for registered values}
                                    <SEP>
                                    <I:ROWPADINDICATOR> {non-negative}
                                    <SEP>
                                    <K:BACKGROUND>
                                    <SEP>
                                    <K:FOREGROUND>
```

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```
                                    <SEP>
                                    <SDR:METHODSPECIFICPARAMS>
                                    <SEP>
                                    <B:COMPRESSEDCELLS>
                                <TERM>

<SDR:METHODSPECIFICPARAMS>      ::=  <>{for compression types 1-5}
                                |<<I: i_I><SEP><I: 1>
                                    <SEP><I: RUNCOUNTPRECISION>>{for type 6}
                                |     {defined in the register, for type>6}
```

NOTE 3 i_I in the above denotes the integer value of the 'data type designator' for data type I as assigned in Annex C of ISO/IEC 8632-1.

NOTE 4 See 6.3.7 for complete SDR delimiting and formatting requirements.

```
TILE                            ::=  <TILE>
                                    <SOFTSEP>
                                    <I:CMPRSNTYPE>
                                       {0=null background,  1=null foreground,
                                       2=T6, 3=T4 1-dimensional, 4=T4 2-dimensional,
                                       5=bitmap, 6=run length,
                                       >6, reserved for registered values}
                                    <SEP>
                                    <I:ROWPADINDICATOR> {non-negative}
                                    <SEP>
                                    <CELLCOLRPREC>
                                    <SEP>
                                    <SDR:METHODSPECIFICPARAMS>
                                    <SEP>
                                    <B:COMPRESSEDCELLS>
                                <TERM>
```

See CELL ARRAY (LOCLCOLRPREC parameter) for discussion of the CELLCOLRPREC production.

7.6 Encoding attribute elements

```
LINE BUNDLE INDEX               ::=  LINEINDEX
                                    <SOFTSEP>
                                    <I:BUNDLEINDEX>  {positive}
                                <TERM>

LINE TYPE                       ::=  LINETYPE
                                    <SOFTSEP>
                                    <I:LINETYPE>
                                       { 1=solid, 2=dash, 3=dot,
                                       4=dash-dot, 5=dash-dot-dot,
                                       >5 reserved for registered values,
                                       <0 private line types}
                                <TERM>

LINE WIDTH                      ::=  LINEWIDTH
                                    <SOFTSEP>
                                    <V:LINEWIDTH>  {non-negative}
                                <TERM>

LINE COLOUR                     ::=  LINECOLR
                                    <SOFTSEP>
                                    <K:LINECOLR>
                                <TERM>

MARKER BUNDLE INDEX             ::=  MARKERINDEX
                                    <SOFTSEP>
```


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```
                                    <I:BUNDLEINDEX>  {positive}
                                <TERM>

MARKER TYPE                 ::= MARKERTYPE
                                    <SOFTSEP>
                                    <I:MARKERTYPE>
                                       { 1=dot, 2=plus, 3=asterisk, 4=circle
                                       5=cross,
                                       >5 reserved for registered values,
                                       <0 private marker types }
                                <TERM>

MARKER SIZE                 ::= MARKERSIZE
                                    <SOFTSEP>
                                    <V:MARKERSIZE>  {non-negative}
                                <TERM>

MARKER COLOUR               ::= MARKERCOLR
                                    <SOFTSEP>
                                    <K:MARKERCOLR>
                                <TERM>

TEXT BUNDLE INDEX           ::= TEXTINDEX
                                    <SOFTSEP>
                                    <I:BUNDLEINDEX>   {positive}
                                <TERM>

TEXT FONT INDEX             ::= TEXTFONTINDEX
                                    <SOFTSEP>
                                    <I:FONTINDEX>     {positive}
                                <TERM>

TEXT PRECISION              ::= TEXTPREC
                                    <SOFTSEP>
                                    < STRING | CHAR | STROKE >
                                <TERM>

CHARACTER EXPANSION FACTOR  ::= CHAREXPAN
                                    <SOFTSEP>
                                    <R:FACTOR>     {non-negative}
                                <TERM>

CHARACTER SPACING           ::= CHARSPACE
                                    <SOFTSEP>
                                    <R:SPACING>
                                <TERM>

TEXT COLOUR                 ::= TEXTCOLR
                                    <SOFTSEP>
                                    <K:TEXTCOLR>
                                <TERM>

CHARACTER HEIGHT            ::= CHARHEIGHT
                                    <SOFTSEP>
                                    <VDC:CHARHEIGHT>  {non-negative}
                                <TERM>

CHARACTER ORIENTATION       ::= CHARORI
                                    <SOFTSEP>
                                    <DELTAPAIR> {up vector}
                                    <SEP>
                                    <DELTAPAIR> {base vector}
```

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<TERM>

TEXT PATH ::= TEXTPATH
<SOFTSEP>
< RIGHT | LEFT | UP | DOWN >
<TERM>

TEXT ALIGNMENT ::= TEXTALIGN
<SOFTSEP>
< NORMHORIZ | LEFT | CTR | RIGHT | CONTHORIZ >
<SEP>
< NORMVERT | TOP | CAP | HALF | BASE | BOTTOM | CONTVERT >
<SEP>
<R:CONTINUOUS_HORIZONTAL>
<SEP>
<R:CONTINUOUS_VERTICAL>
<TERM>

CHARACTER SET INDEX ::= CHARSETINDEX
<SOFTSEP>
<I:CHARSETINDEX> {positive}
<TERM>

ALTERNATE CHARACTER SET INDEX ::= ALTCHARSETINDEX
<SOFTSEP>
<I:ALTCHARSETINDEX> {positive}
<TERM>

FILL BUNDLE INDEX ::= FILLINDEX
<SOFTSEP>
<I:BUNDLEINDEX> {positive}
<TERM>

INTERIOR STYLE ::= INTSTYLE
<SOFTSEP>
<HOLLOW | SOLID | PAT | HATCH | EMPTY | GEOPAT | INTERP>
<TERM>

FILL COLOUR ::= FILLCOLR
<SOFTSEP>
<K:FILLCOLR>
<TERM>

HATCH INDEX ::= HATCHINDEX
<SOFTSEP>
<I:HATCHINDEX>
{ 1=horizontal,
2=vertical
3=positive slope
4=negative slope
5=horizontal/vertical cross
6= positive/negative slope cross
>6 reserved for registered values,
<0 private hatch styles }
<TERM>

PATTERN INDEX ::= PATINDEX
<SOFTSEP>
<I:PATINDEX> {positive}
<TERM>

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EDGE BUNDLE INDEX ::= EDGEINDEX
<SOFTSEP>
<I:BUNDLEINDEX> {positive}
<TERM>

EDGE TYPE ::= EDGETYPE
<SOFTSEP>
<I:EDGETYPE>
{ 1=solid, 2=dash, 3=dot,
4=dash-dot, 5=dash-dot-dot,
>5 reserved for registered values,
<0 private edge types }
<TERM>

EDGE WIDTH ::= EDGEWIDTH
<SOFTSEP>
<V:EDGEWIDTH> {non-negative}
<TERM>

EDGE COLOUR ::= EDGECOLR
<SOFTSEP>
<K:EDGECOLR>
<TERM>

EDGE VISIBILITY ::= EDGEVIS
<SOFTSEP>
< OFF | ON >
<TERM>

FILL REFERENCE POINT ::= FILLREFPT
<SOFTSEP>
<P:FILLREFPT>
<TERM>

PATTERN TABLE ::= PATTABLE
<SOFTSEP>
<I:PATINDEX> {positive}
<SEP>
<I:NX> {positive}
<SEP>
<I:NY> {positive}
<LOCLCOLRPREC>
<CELLROW>*
<TERM>

See CELL ARRAY for discussion of the LOCLCOLRPREC and CELLROW productions.

PATTERN SIZE ::= PATSIZE
<SOFTSEP>
<V_DELTAPAIR> {height vector}
<SEP>
<V_DELTAPAIR> {width vector}
<TERM>

NOTE 1 Pattern size may only be 'absolute' (VDC) in Version 1 and 2 metafiles. In Version 3 and Version 4 metafiles it may be expressed in any of the 4 modes which can be selected with INTERIOR STYLE SPECIFICATION MODE.

<V_DELTAPAIR> ::= <OPTSEP>
<V:DELTAX>
<SEP>
<V:DELTAY>

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```
COLOUR TABLE            ::=  COLRTABLE
                                 <SOFTSEP>
                                 <I:STARTINGINDEX>   {non-negative}
                                 < <SEP> <DIRECTCOLR> >+
                             <TERM>

ASPECT SOURCE FLAGS     ::=  ASF
                                 <SOFTSEP>
                                 <ASFPAIR>
                                 < <SEP> <ASFPAIR> >*
                             <TERM>

ASFPAIR                 ::=  < ASFTYPE >
                                 <SEP>
                                 < INDIV | BUNDLED >

ASFTYPE                 ::=  < ASFNAME | PSEUDOASF >

ASFNAME                 ::=  < LINETYPE | LINEWIDTH | LINECOLR |
                                 MARKERTYPE | MARKERSIZE | MARKERCOLR |
                                 TEXTFONTINDEX | TEXTPREC | CHAREXPAN |
                                 CHARSPACE | TEXTCOLR | INTSTYLE |
                                 FILLCOLR | HATCHINDEX | PATINDEX |
                                 EDGETYPE | EDGEWIDTH | EDGECOLR >

PSEUDOASF               ::=  < ALL | ALLLINE | ALLMARKER | ALLTEXT |
                                 ALLFILL | ALLEDGE >
```

The ASF type may either be a valid ASF name, or a pseudo-ASF. If the former, then the name shall match the name of the corresponding attribute element.

NOTE 2 The pseudo-ASFs are a shorthand convenience for setting a number of ASFs at once.

The pseudo-ASFs have the meanings:

ALL set all ASFs as indicated.

ALLLINE: set LINETYPE, LINEWIDTH, and LINECOLR ASFs as indicated.

ALLMARKER: set MARKERTYPE, MARKERSIZE, and MARKERCOLR ASFs as indicated.

ALLTEXT: set TEXTFONTINDEX, TEXTPREC, CHAREXPAN, CHARSPACE, and TEXTCOLR ASFs as indicated.

ALLFILL: set INTSTYLE, FILLCOLR, HATCHINDEX, and PATINDEX ASFs as indicated.

ALLEDGE: set EDGETYPE, EDGEWIDTH, and EDGECOLR as indicated.

```
PICK IDENTIFIER         ::=  PICKID
                                 <SOFTSEP>
                                 <I:PICKID>
                             <TERM>

LINE CAP                ::=  LINECAP
                                 <SOFTSEP>
                                 <I:LINECAP>
                                    {1=unspecified, 2=butt, 3=round,
                                    4=projecting square, 5=triangle,
                                    >5 reserved for registered values }
                                 <SEP>
                                 <I:DASHCAP>
                                    {1=unspecified, 2=butt, 3=match,
                                    >3 reserved for registered values}
                             <TERM>
```


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```
LINE JOIN                       ::=  LINEJOIN
                                       <SOFTSEP>
                                       <I:JOIN>
                                          {1=unspecified, 2=mitre,
                                          3=round, 4=bevel,
                                          >4 reserved for registered values}
                                     <TERM>

LINE TYPE CONTINUATION          ::=  LINETYPECONT
                                       <SOFTSEP>
                                       <I:CONTMODE>
                                          {1=unspecified, 2=continue,
                                          3=restart, 4=adaptive continue,
                                          >4 reserved for registered values}
                                     <TERM>

LINE TYPE INITIAL OFFSET        ::=  LINETYPEINITOFFSET
                                       <SOFTSEP>
                                       <R:PATTERNOFFSET>
                                     <TERM>

TEXT SCORE TYPE                 ::=  TEXTSCORETYPE
                                       <SOFTSEP>
                                       < <I:SCORETYPE>
                                          {1=right score, 2=left score,
                                          3=through score, 4=kendot,
                                          >4 reserved for registered values}
                                       <SEP>
                                       <OFF | ON> >+
                                     <TERM>

RESTRICTED TEXT TYPE            ::=  RESTRTEXTTYPE
                                       <SOFTSEP>
                                       <I:RESTRICTIONTYPE>
                                          {1=basic, 2=boxed-cap, 3=boxed-all,
                                          4=isotropic-cap, 5=isotropic-all, 6=justified,
                                          >6 reserved for registered values}
                                     <TERM>

INTERPOLATED INTERIOR           ::=  INTERPINT
                                       <SOFTSEP>
                                       <I:STYLE>
                                          {1=parallel, 2=elliptical, 3=triangular,
                                          >3 reserved for registered values}
                                       <SEP>
                                       < <<V:X><SEP><V:Y>>(1)    {parallel}
                                     |   <<V:X><SEP><V:Y>>(2) >  {elliptical, triangular}
                                       <SEP><I:NBROFSTAGES>
                                       <<SEP><R:STAGEDESGN>>(m)
                                       <<<SEP><K:REFCOLRLIST>>(m+1) {parallel,elliptical}
                                     |  <<SEP><K:REFCOLRLIST>>(3)>      {triangular}
                                          {m is the number of stages}
                                     <TERM>

EDGE CAP                        ::=  EDGECAP
                                       <SOFTSEP>
                                       <I:EDGECAP>
                                          {1=unspecified, 2=butt, 3=round,
                                          4=projecting square, 5=triangle,
                                          >5 reserved for registered values}
                                       <SEP>
```

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<I:DASHCAP>
{1=unspecified, 2=butt, 3=match,
>3 reserved for registered values}
<TERM>

EDGE JOIN ::= EDGEJOIN
<SOFTSEP>
<I:JOIN>
{1=unspecified, 2=mitre,
3=round, 4=bevel,
>4 reserved for registered values}
<TERM>

EDGE TYPE CONTINUATION ::= EDGETYPECONT
<SOFTSEP>
<I:CONTMODE>
{1=unspecified, 2=continue,
3=restart, 4=adaptive continue,
>4 reserved for registered values}
<TERM>

EDGE TYPE INITIAL OFFSET ::= EDGETYPEINITOFFSET
<SOFTSEP>
<R:PATTERNOFFSET>
<TERM>

SYMBOL LIBRARY INDEX ::= SYMBOLINDEX
<SOFTSEP>
<I:INDEX> {positive}
<TERM>

SYMBOL COLOUR ::= SYMBOLCOLR
<SOFTSEP>
<K:SYMBOLCOLOUR>
<TERM>

SYMBOL SIZE ::= SYMBOLSIZE
<SOFTSEP>
<HEIGHT | WIDTH | BOTH>
<SEP>
<VDC:HEIGHT>
<SEP>
<VDC:WIDTH>
<TERM>

SYMBOL ORIENTATION ::= SYMBOLORI
<SOFTSEP>
<DELTAPAIR> {up vector}
<SEP>
<DELTAPAIR> {base vector}
<TERM>

7.7 Encoding escape elements

ESCAPE ::= ESCAPE
<SOFTSEP>
<I:IDENTIFIER>
< <OPTSEP> | <HARDSEP> >
<S:DATARECORD>
<TERM>

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7.8 Encoding external elements

MESSAGE ::= MESSAGE
<SOFTSEP>
< NOACTION | ACTION >
< <OPTSEP> | <HARDSEP> >
<SF:MESSAGE_TEXT>
<TERM>

APPLICATION DATA ::= APPLDATA
<SOFTSEP>
<I:IDENTIFIER>
< <OPTSEP> | <HARDSEP> >
<S:DATARECORD>
<TERM>

7.9 Encoding segment control and segment attribute elements

COPY SEGMENT ::= COPYSEG
<SOFTSEP>
<I:SEGID>
<SEP>
<TM:TRANMATRIX>
<NO|YES>
<TERM>

INHERITANCE FILTER ::= INHFILTER
<SOFTSEP>
<ELEMORGROUPNAME>
<<SEP><ELEMORGROUPNAME>>*
<SEP>
<STLIST|SEG>
<TERM>

ELEMORGROUPNAME ::= <LINEINDEX |
LINETYPE |
LINEWIDTH |
LINECOLR |
LINECLIPMODE |
MARKERINDEX |
MARKERTYPE |
MARKERSIZE |
MARKERCOLR |
MARKERCLIPMODE |
TEXTINDEX |
TEXTFONTINDEX |
TEXTPREC |
CHAREXPAN |
CHARSPACE |
TEXTCOLR |
CHARHEIGHT |
CHARORI |
TEXTPATH |
TEXTALIGN |
FILLINDEX |
INTSTYLE |
FILLCOLR |
HATCHINDEX |
PATINDEX |
EDGEINDEX |

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EDGETYPE |
EDGEWIDTH |
EDGECOLR |
EDGEVIS |
EDGECLIPMODE |
FILLREFPT |
PATSIZE |
AUXCOLR |
TRANSPARENCY |
LINEATTR |
MARKERATTR |
TEXPRESANDPLACEMATTR |
TEXTPLACEMANDORIATTR |
FILLATTR |
EDGEATTR |
PATATTR |
OUTPUTCTRL |
PICKID |
ALLATTRCTRL |
ALLINH |
LINETYPEASF |
LINEWIDTHASF |
LINECOLRASF |
MARKERTYPEASF |
MARKERSIZEASF |
MARKERCOLRASF |
TEXTFONTINDEXASF |
TEXTPRECASF |
CHAREXPANASF |
CHARSPACEASF |
TEXTCOLRASF |
INTSTYLEASF |
FILLCOLRASF |
HATCHINDEXASF |
PATINDEXASF |
EDGETYPEASF |
EDGEWIDTHASF |
EDGECOLRASF |
ALLLINE |
ALLMARKER |
ALLTEXT |
ALLFILL |
ALLEDGE |
ALL |
MITRELIMIT |
LINECAP |
LINEJOIN |
LINETYPECONT |
LINETYPEINITOFFSET |
TEXTSCORETYPE |
RESTRTEXTTYPE |
INTERPOLATEDINTERIOR |
EDGECAP |
EDGEJOIN |
EDGETYPECONT |
EDGETYPEINITOFFSET |
SYMBOLLIBINDEX |
SYMBOLCOLR |
SYMBOLSIZE |
SYMBOLORI |

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SYMBOLATTR>

NOTE 1 ALLINH means all attributes, control elements and ASFs. ALLLINE, ALLMARKER, ALLTEXT, ALLFILL, ALLEDGE and ALL have the meaning defined in 7.7.

CLIP INHERITANCE ::= CLIPINH
<SOFTSEP>
<STLIST|INTERSECTION>
<TERM>

SEGMENT TRANSFORMATION ::= SEGTRAN
<SOFTSEP>
<I:SEGID>
<SEP>
<TM:TRANMATRIX>
<TERM>

SEGMENT HIGHLIGHTING ::= SEGHIGHL
<SOFTSEP>
<I:SEGID>
<SEP>
<NORMAL|HIGHL>
<TERM>

SEGMENT DISPLAY PRIORITY ::= SEGDISPPRI
<SOFTSEP>
<I:SEGID>
<SEP>
<I:DISPLAYPRIORITY> {non-negative}
<TERM>

SEGMENT PICK PRIORITY ::= SEGPICKPRI
<SOFTSEP>
<I:SEGID>
<SEP>
<I:PICKPRIORITY> {non-negative}
<TERM>

7.10 Encoding application structure descriptor elements

APPLICATION STRUCTURE ATTRIBUTE ::=APSATTR
<SOFTSEP>
<SF:APSATTRTYPE>
<SEP>
<SDR:DATARECORD>
<TERM>

8 Clear text encoding defaults

CGM precisions for the Clear Text Encoding:

Non-VDC Reals:

MINREAL = -32767

MAXREAL = 32767

DIGITS = 4

VDC Precision for Reals:

MINREAL = 0.0

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MAXREAL = 1.0

DIGITS = 4

Non-VDC Integers, Integer VDC:

MININT = -32767

MAXINT = 32767

Index:

MININT = 0

MAXINT = 127

Colour Index:

MAXINT = 127

Colour Precision:

MAXCOMPONENT = 255

Colour Value Extent:

BLACK = 0,0,0

WHITE = 255,255,255, if COLOUR MODEL is RGB;

WHITE = 0,0,0,0

BLACK = 255,255,255,255, if COLOUR MODEL is CMYK;

All scale and offset components are identically 0.0 if the COLOUR MODEL is CIELAB, CIELUV, or RGB-related.

NAME PRECISION:

MININT = -32767

MAXINT = 32767

9 Profile encoding rules, proforma, and Model Profile

9.1 Encodings

Precisions are defined consistently with the principles of the encodings, not necessarily for inter-encoding translation. Where both considerations might apply, compatibility with the principles of the encoding are considered first and inter-encoding translation second.

9.2 Metafile defaults

Clause 8 of part 1 and clause 8 of this part address all elements which have default values for the Clear Text encoding. While no profile can change these values, an equivalent effect may be achieved by use of the METAFILE DEFAULTS REPLACEMENT element. Profiles may require that a metafile contain a METAFILE DEFAULTS REPLACEMENT element with well-defined content.

9.3 Profile Proforma tables (PPF)

All elements are included in the Profile Proforma in Part 1. These include the following elements with specific requirements for clear text encoding:

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Metafile descriptor elements: INTEGER PRECISION, REAL PRECISION, INDEX PRECISION, COLOUR PRECISION, COLOUR INDEX PRECISION, NAME PRECISION,

Control elements: VDC INTEGER PRECISION, and VDC REAL PRECISION.

The Profile Proforma fragments specifically directed to clear text encoding is contained in table 16 and table 18 of part 1, annex I. These tables, when completed by the author of the profile, contain the normative specifications of the profile.

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Annex A
(normative)

Clear text encoding dependent format grammar

ALPHA ::= "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" |
"J" | "K" | "L" | "M" | "N" | "O" | "P" | "Q" | "R" |
"S" | "T" | "U" | "V" | "W" | "X" | "Y" | "Z" |
"a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" |
"j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r" |
"s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"

DIGIT ::= "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

NULLCHAR ::= "_" | "$"

CGM opcodes are encoded as element names, and enumerated types are bound to names, as follows:

NAME ::= <NULLCHAR>*
<ALPHA>
<ALPHA> | <DIGIT> | <NULLCHAR> >*

The <element name> production is encoded in this encoding as the value of the associated clear text opcode, see 6.4.5.

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Annex B
(informative)

Clear text encoding example

```
BEGMF 'metafile example';
    mfversion  1; mfdesc'24 January 1984'; vdctype real;
    indexprec -127,127;
    maxcolrindex 7; mfelemlist 'drawingplus';
    font_list 'Helvetica',
        'Perpetua Bold',
        'CGM_GENERIC: light italic'
        ;
    BEGMFDEFAULTS;
        VDCEXT 0,0,1,1;
        text_font_index 2;
        int_style solid;
    ENDMFDEFAULTS;

    % simple picture %
    BEGPIC 'PN 007' ;
        marker_size_mode abs;
    BEGPICBODY;
        % frame %
        line (0,0) (1,0) (1,1) (0,1) (0,0);

        % big dot %
        asf intstyle indiv; circle .5 .5 .3125;

        asf marker_size indiv, marker_type indiv;
        marker_size .005;
```

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```
        marker_type -3;  % implementation-dependent %
        marker .01 .01
            .5 .5     % note 1 element on several lines %
            .99 .99/
        char_height .04 ;
        text_align ctr, bottom, 0, 0;
        text (.5,0) notfinal "PN 007 is a";
        text_font_index 3 ; apnd_text notfinal ' "silly" ';
        text_font_index 1 ; apnd_text final 'example';
    ENDPIC;
ENDMF ;
```


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