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EUROPEAN STANDARD

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January 1994

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Descriptors: Data processing, graphic data processing, information interchange, data handling, data transfer, data representation, data codes, binary digits, files

English version

**Information technology - Computer graphics -
Metafile for the storage and transfer of picture
description information - Part 3: Binary encoding
(ISO/IEC 8632-3:1992)**

Technologies de l'information - Infographie -
Métafichier de stockage et de transfert des
informations de description d'images - Partie
3: Codage binaire (ISO/IEC 8632-3:1992)

Informationstechnik - Graphische
Datenverarbeitung Datei für die Speicherung und
Übertragung von Bildinformationen - Teil 3:
Binärikodierung (ISO/IEC 8632-3:1992)

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REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO
Urad RS za standardizacijo in meroslovje
LJUBLJANA

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PREVZET PO METODI RAZGLASITVE

-12- 1997

This European Standard was approved by CEN on 1994-01-14. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

On the proposal of the CEN Central Secretariat, the Technical Board decided to submit the International Standard:

"Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part 3: Binary encoding (ISO/IEC 8632-3:1992)"

to the formal vote.

The result of the formal vote was positive.

For the time being, this document exists only in English and French.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1994, and conflicting national standards shall be withdrawn at the latest by July 1994.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom

Endorsement notice

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The text of the International Standard ISO/IEC 8632-3:1992 was approved by CEN as a European Standard without any modification.



INTERNATIONAL STANDARD

ISO/IEC
8632-3

Second edition
1992-10-01

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

Part 3:
Binary encoding

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*Technologies de l'information — Infographie — Métafichier de stockage
et de transfert des informations de description d'images —
Partie 3: Codage binaire*



Reference number
ISO/IEC 8632-3:1992(E)

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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.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 8632-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

This second edition cancels and replaces the first edition (ISO 8632-3:1987), which has been technically revised.

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 2: Character encoding

Part 3: Binary encoding

Part 4: Clear text encoding

Annex A forms an integral part of this part of ISO/IEC 8632. Annexes B and C are for information only.

Introduction

0.1 Purpose of the Binary Encoding

The Binary Encoding of the Computer Graphics Metafile (CGM) provides a representation of the Metafile syntax that can be optimized for speed of generation and interpretation, while still providing a standard means of interchange among computer systems. The encoding uses binary data formats that are much more similar to the data representations used within computer systems than the data formats of the other encodings.

Some of the data formats may exactly match those of some computer systems. In such cases processing is reduced very much relative to the other standardized encodings. On most computer systems processing requirements for the Binary Encoding will be substantially lower than for the other encodings.

In cases where a computer system's architecture does not match the standard formats used in the Binary Encoding, and where absolute minimization of processing requirements is critical, and where interchange among dissimilar systems does not matter, it may be more appropriate to use a private encoding, conforming to the rules specified in clause 7 of ISO/IEC 8632-1.

0.2 Objectives

This encoding has the following features.

- a) Partitioning of parameter lists: metafile elements are coded in the Binary Encoding by one or more partitions (see clause 4); the first (or only) partition of an element contains the opcode (Element Class plus Element Id).
- b) Alignment of elements: every element begins on a word boundary. When the data of an element (whether partitioned or not) does not terminate on an even-octet boundary, then the following element is aligned by padding after the data of the preceding element with zero bits to the next even-octet boundary. A no-op element is available in this encoding. It is skipped and ignored by interpreters. It may be used to align data on machine-dependent record boundaries for speed of processing.
- c) Uniformity of format: all elements have an associated parameter length value. The length is specified as an octet count. As a result, it is possible to scan the metafile, without interpreting it, at high speed.

ISO/IEC 8632-3:1992 (E)

Introduction

Objectives

- d) Alignment of coordinate data: at default precisions and by virtue of alignment of elements, coordinate data always start on word boundaries. This minimizes processing by ensuring, on a wide class of computing systems, that single coordinates do not have to be assembled from pieces of multiple computer words.
- e) Efficiency of encoding integer data: other data such as indexes, colour and characters are encoded as one or more octets. The precision of every parameter is determined by the appropriate precision as given in the Metafile Descriptor.
- f) Order of bit data: in each word, or unit within a word, the bit with the highest number is the most significant bit. Likewise, when data words are accessed sequentially, the least significant word follows the most significant.
- g) Extensibility: the arrangement of Element Class and Element Id values has been designed to allow future growth, such as new graphical elements.
- h) Format of real data: real numbers are encoded using either IEEE floating point representation or a metafile fixed-point representation.
- i) Run length encoding: if many adjacent cells have the same colour (or colour index) efficient encoding is possible. For each run a cell count is specified followed by the colour (or colour index).
- j) Packed list encoding: if adjacent colour cells do not have the same colour (or colour index) the metafile provides bit-stream lists in which the values are packed as closely as possible.

0.3 Relationship to other International Standards

The floating point representation of real data in this part of ISO/IEC 8632 is that in ANSI/IEEE 754-1986.

The representation of character data in this part of ISO/IEC 8632 follows the rules of ISO/IEC 646 and ISO 2022.

For certain elements, the CGM defines value ranges as being reserved for registration. The values and their

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

Part 3 : Binary encoding

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1 Scope

This part of ISO/IEC 8632 specifies a binary encoding of the Computer Graphics Metafile. For each of the elements specified in ISO/IEC 8632-1, this part specifies an encoding in terms of data types. For each of these data types, an explicit representation in terms of bits, octets and words is specified. For some data types, the exact representation is a function of the precisions being used in the metafile, as recorded in the METAFILE DESCRIPTOR.

This encoding of the Computer Graphics Metafile will, in many circumstances, minimize the effort required to generate and interpret the metafile.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 8632. At the time of publication, the editions indicated were valid. All standards are subject to revision, and 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 standards listed below. Members of IEC and ISO 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*.

ANSI/IEEE 754, *Standard for Binary Floating Point Arithmetic*.

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3 Notational conventions

"Command Header" is used throughout this part of ISO/IEC 8632 to refer to that portion of a Binary-Encoded element that contains the opcode (element class plus element id) and parameter length information (see clause 4).

Within this part, the terms "octet" and "word" have specific meanings. These meanings may not match those of a particular computer system on which this encoding of the metafile is used.

An octet is an 8-bit entity. All bits are significant. The bits are numbered from 7 (most significant) to 0 (least significant).

A word is a 16-bit entity. All bits are significant. The bits are numbered from 15 (most significant) to 0 (least significant).

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