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Information technology — Computer graphics, image processing and environmental data representation — Procedures for registration of items

Technologies de l'information — Infographie, traitement de l'image et représentation des données environnementales — Procédures pour l'enregistrement des articles

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Contents

Page

Foreword ... iv

Introduction ... v

1 Scope ... 1

2 Normative references ... 1

3 Terms and definitions ... 1

4 The registration authority ... 2
4.1 Appointment of a registration authority ... 2
4.2 Responsibilities of registration authority ... 2

5 Register of items ... 3
5.1 Availability of registers ... 3
5.2 Initial assignments and additions ... 3
5.3 Deprecations ... 5
5.4 Modifications ... 5
5.5 Future standards ... 5
5.6 Recipients of register activity notices ... 6
5.7 Addition of classes ... 6

6 Sponsoring authorities ... 8
6.1 Definition of sponsoring authority ... 8
6.2 Responsibilities of sponsoring authorities ... 8
6.3 Registration form ... 8

Annex A (normative) **Information needed to submit proposals** ... 9

Annex B (informative) **Example forms for proposals and registered items** ... 10

Annex C (informative) **Language binding guidelines** ... 28

Annex D (informative) **Encoding guidelines** ... 30

Bibliography ... 33

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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 document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 9973 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics, image processing and environmental data representation*.

This second edition cancels and replaces the first edition (ISO/IEC 9973:1994), which has been technically revised.

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Introduction

This International Standard provides a set of procedures for the registration of items. In this context, items refers to all registered items defined within the standards developed by ISO/IEC JTC 1/SC 24. ISO/IEC JTC 1/SC 24 is responsible for preparing standards for interchange of information involving *computer graphics, image processing and environmental data representation*.

All proposed and anticipated standards in this area share certain classes of items that are allowed to vary across implementations of the standard. Nevertheless, there is a strong incentive for implementations using the same registered items to reference them in the same way. Each standard developed by ISO/IEC JTC 1/SC 24, therefore, has the potential to provide for registration of certain items. Standards shall expressly identify items to be registered. When a standard is published, those categories of items identified for registration are automatically included in the registry.

This International Standard specifies procedures to be followed in preparing and maintaining the ISO/IEC International Register of Items, containing the identifiers and associated information assigned to particular items. The purpose of the register is to inform all concerned of items already registered and of the specific identifiers assigned to them. The register includes current classes of registered items for relevant International Standards developed by ISO/IEC JTC 1/SC 24. The classes of registered items are listed with the registry and therefore maintained separately from this International Standard. This International Standard will be updated as necessary for future standards developed by ISO/IEC JTC 1/SC 24.

Publication of the register promotes international information exchange and avoids duplication of effort in development of application-oriented items. Registration provides identification for an item but should not be regarded as a standardization procedure. However, as a matter apart from registration, the registered items may, but need not, be the subject of an international, national, or other standard. In these cases, the register shall reference the applicable standard. When such a standard is amended subsequent to registration of an item(s), it would be appropriate for the registered identifier of the item(s) to be indicated in that standard.

Annex A identifies the information needed for registration proposals. Annex B contains example proposal and register forms. Annex C contains language binding guidelines for registry submission. Annex D contains encoding guidelines for registry submission.

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Information technology — Computer graphics, image processing and environmental data representation — Procedures for registration of items

1 Scope

This International Standard specifies procedures to be followed in preparing, maintaining and publishing a register of identifiers and meanings for standards under the direction of ISO/IEC JTC 1/SC 24.

NOTE These procedures may be used to extend any standard developed by ISO/IEC JTC 1/SC 24. Some registration items are graphical in nature; other registration items define data structures used by the ISO/IEC JTC 1/SC 24 standards. All registered items are intended for reuse within other adjunct standards.

Registration procedures do not assign values of identifiers that are defined as being workstation-dependent by specific graphics standards. The register of font appearance in the ISO/IEC JTC 1/SC 24 register for graphical items is not intended to address the broader issues of general-purpose font registration. The procedures apply to registration of individual items within classes as reserved for registration in the International Standards developed by ISO/IEC JTC 1/SC 24.

2 Normative references

This standard requires no normative references.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
clarification
non-substantive change to a registered item

NOTE A non-substantive change does not change the semantics or technical meaning of the item. Clarification does not result in a change to the registration status of the registered item.

3.2
class
set of items with common properties or that are common in application to a relevant International Standard

EXAMPLE This International Standard has classes of registered items that are applicable to computer graphics,-environmental data representation and/or implementation profiles of International Standards.

NOTE Class is used in this context to refer to a set of instances, not the concept abstracted from that set of instances [adapted from ISO 19135].

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3.3
deprecated item
registered items which have been found obsolete or to which an objection or desire to cause the removal of has been raised

NOTE Deprecated items will be retained in the register, but marked as “deprecated” to note the recommendation of avoiding the use of this registered item.

3.4
Generalized Drawing Primitive
GDP
primitive required for graphical item registration

3.5
notification recipients
all member bodies, Category A, B and C liaisons, including sponsoring authorities

3.6
register
set of files containing identifiers assigned to items with descriptions of the associated items as defined by the relevant International Standard
[ISO 19135]

3.7
registration
assignment of a permanent, unique and unambiguous identifier to an item with its related descriptive information

3.8
registration authority
organization to which management of a **register** has been designated by ISO Technical Management Board at the proposal of the technical committee concerned

3.9
registry
information system on which a **register** is maintained
[adapted from ISO/IEC 11179-3]

4 The registration authority

4.1 Appointment of a registration authority

A qualified and internationally acceptable body concerned with computer elements developed under the scope of ISO/IEC JTC 1/SC 24 is recommended by ISO/IEC JTC 1/SC 24 to ISO/IEC for acceptance by Council to act as the registration authority for the purposes of this International Standard. The registration authority for ISO/IEC 9973 is established in agreement with ISO and is approved by the ISO Technical Management Board as part of a ten-year agreement to maintain the registry. Contact information for Registration Authorities of International Standards including this one are maintained and available at
www.iso.org/iso/en/prods-services/catalogue/maralist.html

4.2 Responsibilities of registration authority

The Registration Authority shall maintain a register of identifiers and meanings assigned to items in the register. Upon request, the registration authority shall distribute an information pack containing a description of the register and how to submit proposals. The responsibilities of the registration authority are more completely described in Clause 5 and Figures 1 and 2.

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5 Register of items

5.1 Availability of registers

The contents of any registers established under the procedures of this International Standard shall be available to the public under the terms and conditions set by the registration authority. Portions of the register may be obtained by standards developers at no charge under the terms and conditions set by the registration authority.

5.2 Initial assignments and additions

The establishment of a register under the procedures of this International Standard allows for multiple categories of items including:

- identifiers and meanings assigned to graphical items;
- profiles of International Standards, and
- environmental data representation items.

With regard to initial assignment of identifiers and meanings to registered items and subsequent additions to the register, the responsibilities of the registration authority are specified below and depicted in Figure 1:

a) to receive proposals from sponsoring authorities (see Clause 6);

b) to ascertain, by referring proposals to the Secretariat of ISO/IEC JTC 1/SC 24 or by a vote within the subcommittee, whether each proposal should be accepted, accepted subject to amendment, or rejected according to stated criteria. Criteria for rejecting a proposal include:

   1) incomplete or incomprehensible definition of item(s);

   2) incorrect or incomplete language binding or data encoding (reference Annex D Language binding guidelines);

   3) existence of an identical item in the register;

   4) item class not in register;

   5) not-applicable to any of the International Standards developed by ISO/IEC JTC 1/SC 24;

   6) inadequate justification for inclusion in the register.

   Voting discrepancies shall be resolved following attempts to meet objections raised by negative votes.

c) to assign a proposal identifier to each proposal,

d) to assign a register identifier to each accepted item. The register identifier shall consist of a section name followed by a unique registration number within the section, which is:

   1) the value of identifier of the item, if this is a number or,

   2) some appropriate number assigned by the registration authority, if the value of identifier of item is not a number;

e) to announce to all notification recipients of the items accepted for registration. This is accomplished by sending the table of contents and a cross-reference list matching the proposal identifier with the registered item;

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f) to inform the appropriate sponsoring authority of the results when processing of a proposal has been completed;

g) to add new classes of items to the current list of classes;

h) to provide copies of the register and associated documents to members of the public on request;

i) to distribute the current list of classes of items upon request.

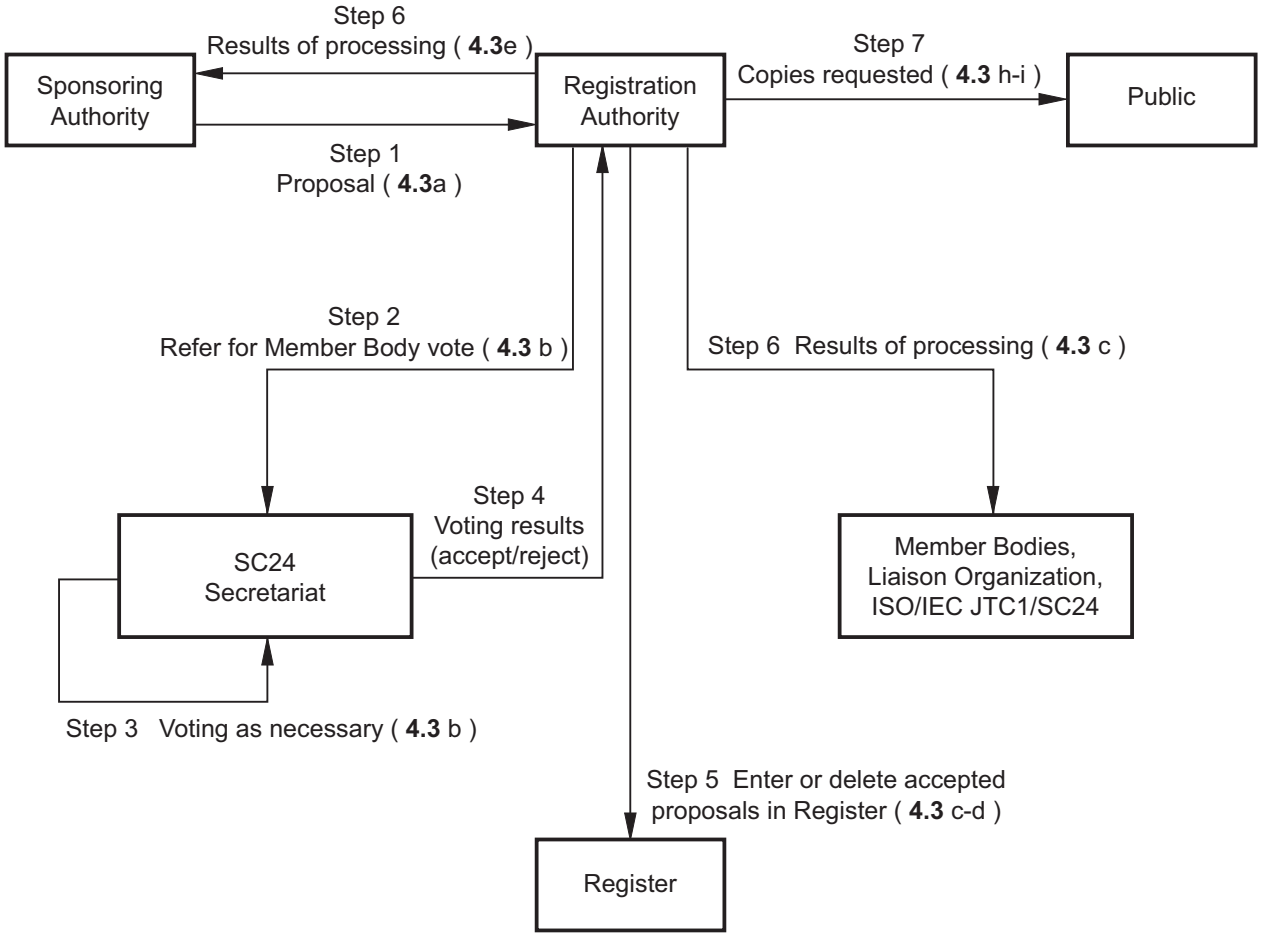

Figure 1 — Explanation of registration steps

Step 1 a sponsoring authority submits a proposal for item(s) to be registered to the registration authority after insuring it is complete

Step 2 - the registration authority forwards this proposal to the ISO/IEC JTC 1/SC 24 secretariat for member body vote

Step 3 - ISO/IEC JTC 1/SC 24 conducts a letter ballot vote

Step 4 - ISO/IEC JTC 1/SC 24 processes the results of the letter ballot and decides if the proposal is accepted or rejected

Step 5 - the register is updated to reflect the results of the letter ballot

Step 6 - the registration authority distributes the results of the votes to the member body, sponsoring authority, and the Liaison Organizations of ISO/IEC JTC 1/SC 24

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Step 7 - copies of the register are available to the public according to the terms and conditions defined by the registration authority

5.3 Deprecations

No items shall be deleted from a register but shall be retained and marked as deprecated. A separate table of deprecated items shall be maintained for each class, which may be accessed by register users. Any comments that a sponsoring authority may desire to make concerning a proposed deprecation shall be directed to the Secretariat of ISO/IEC JTC 1/SC 24 for consideration. With regard to deprecations, the responsibilities of the registration authority shall be as follows:

a) to receive proposals from the sponsoring authorities (see Clause 6);

b) to inform the sponsoring authority that originally submitted the item for registration of the proposed deprecation, both in items identified for automatic registration as identified from a new standard and for those items submitted post-publication to the registration authority;

c) to ascertain whether each proposal should be accepted or rejected by referring proposals to the Secretariat of ISO/IEC JTC 1/SC 24 for a Member Body vote within the subcommittee;

d) to continue to include the item in the register, identify its status as deprecated and the date of deprecation, and identify the item that replaces it, if any;

e) to announce items marked as deprecated from the register to notification recipients;

f) to inform the sponsoring authority identified in b) of the results when processing of a proposal has been completed.

5.4 Modifications

5.4.1 Amendment of registered items

Once a proposal for registration of a particular item has been accepted and distributed, no proposals for modification of that item shall be considered. However, proposals for additional language bindings and encodings may be submitted for inclusion. These proposals are handled the same way as new proposals. Additional features of language binding or encoding shall be added to the existing registered items without change to the existing information.

5.4.2 Clarification of registered items

Sponsoring authorities may submit requests for clarifications on registered items. A clarification shall not cause any substantive change to a registered item. Otherwise it shall be treated as a new item. Approved clarifications shall be promulgated by the registration authority, and shall be treated as additional information attached to a registered item as a note. The registration authority at their discretion shall handle editorial clarifications.

5.5 Future standards

Standards shall expressly identify items to be registered. Upon approval of the new International Standard, the Secretary shall receive a list of the new classes that need to be identified for the register from the Standard Editor. The Secretary shall then provide to the registration authority this list of new classes as a mode of automating the incorporation of these classes. When a standard is published, those classes of items identified for registration shall be automatically included in the registry. The registration authority shall update the register to include relationships to additional standards or parts of standards developed by ISO/IEC JTC 1/SC 24.

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5.6 Recipients of register activity notices

All Member Bodies, Liaisons bodies and ISO/IEC JTC 1/SC 24 are notification recipients and shall be provided notification of register activity in the forms of initiation, addition, and deprecation of registered items and identification of new classes.

5.7 Addition of classes

5.7.1 Automatic addition of classes

Standards shall define registry requirements and new classes of registered items within the International Standard text. From these descriptions, the Secretary shall notify the registration authority of class and registry requirements. The registration authority, upon receipt of notification is authorized to expand the list of classes. Such notification to the Secretary and the registration authority shall be made at the time of publication of the International Standard.

5.7.2 Manual addition of classes

The current set of classes is available for reference on the ISO/IEC 9973 registry server and is maintained by the registration authority. Additional classes may be manually added to the register according to Figure 2 below.

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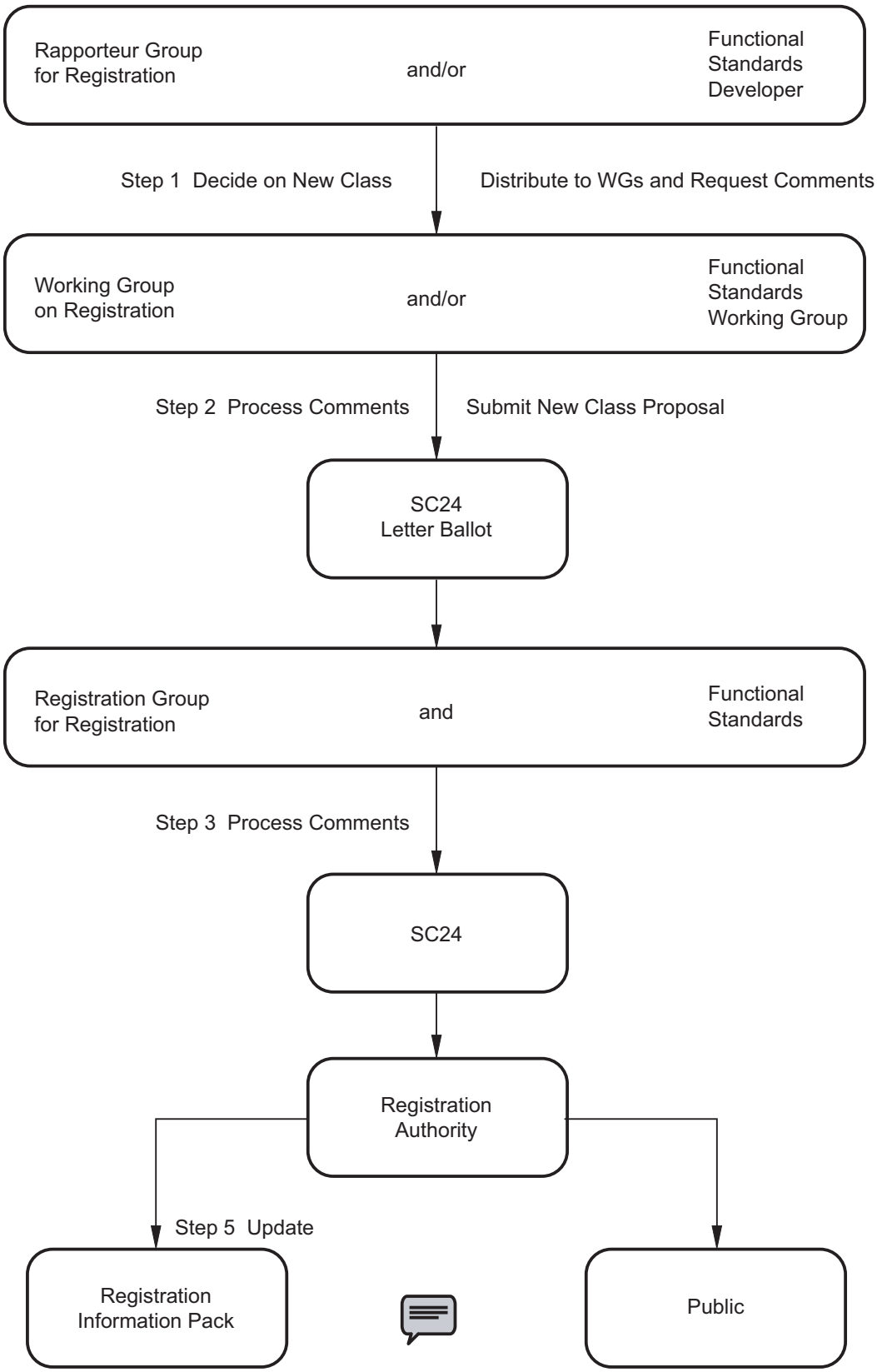

Figure 2 — Steps to Add as New Class

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Step 1 The Registration Rapporteur Group, in consultation with the functional standards Working Group identifies the need for a new class of registered item. The group produces a document that describes the new class that it wishes to sponsor and circulates it to the Working Groups of ISO/IEC JTC 1/SC 24 for comment.

Step 2 The sponsoring Working Group, in collaboration with the Registration Rapporteur Group, processes the comments received and forwards the revised proposal to the Secretariat of ISO/IEC JTC 1/SC 24 for an SC 24 letter ballot.

Step 3 The Registration Rapporteur Group, in consultation with the sponsoring Working Group, resolves any comments submitted with votes.

Step 4 The Secretariat of ISO/IEC JTC 1/SC 24 forwards the final proposal to the registration authority.

Step 5 The registration authority updates the register, the information pack, and distributes the results to the public upon request

6 Sponsoring authorities

6.1 Definition of sponsoring authority

Proposals for changing the content of the register may be made by the following organizations, which for purposes of this International Standard are sponsoring authorities:

a) any ISO or IEC Technical Committee or Subcommittee;

b) any P-member or O-member of ISO/IEC JTC 1 or ISO/IEC JTC 1/SC 24;

c) any international organization having Category A, B, or C liaison status with ISO/IEC JTC 1 or ISO/IEC JTC 1/SC 24.

6.2 Responsibilities of sponsoring authorities

The responsibilities of sponsoring authorities shall be as follows:

a) to receive register item proposals from within their respective countries or organizations;

b) to explain proposals and to coordinate multiple proposals if desired;

c) to ensure that all proposals are completed; if a language binding and/or encoding is required, at least one language binding and/or data encoding for at least one standard developed by ISO/IEC JTC 1/SC 24 shall be included;

d) to ascertain, by referring proposals to their members for a vote, whether each proposal should be accepted, accepted subject to amendment, or rejected. Criteria for rejection of a proposal are listed at 5.2 b);

e) to forward to the registration authority those proposals that have support of the sponsoring authority; and

f) to make known within their respective countries or organizations the decisions taken on proposals as transmitted to them by the registration authority.

6.3 Registration form

Annex A specifies general information necessary to submit a proposal to the registration authority. Detailed information for a particular class may be obtained from the registration authority.

Annex B contains example class and registry item proposals formatted in forms with supporting text.

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Annex A
(normative)

Information needed to submit proposals

Items that can be registered under the procedures of this standard may vary greatly, but are based on standards developed in ISO/IEC JTC 1/SC 24 or standards that are linked by application. In similar ways, the information that is collected and provided for a register may vary based on the needs of users. A minimum standard set of information is required to identify a register and support management.

a) The following information shall be submitted for any register proposal:

   1) presentation date of proposal;

   2) sponsoring authority;

   3) class;

   4) name (if appropriate);

   5) description;

   6) picture or graphic depiction (if appropriate);

   7) justification for inclusion;

   8) at least one language binding or encoding (if appropriate);

   9) additional supporting comments may be included.

b) Unique information is necessary for the following classes:

Markertype:	Alignment Point
Prompt & Echo:	Input Class Data Record Information
GDP:	GDP Identifier
Escape:	Specific Escape Function Identifier (or Escape Identifier)
Error:	Message
Echo Type:	Input Class Data Record Information
Measure Format Identifier:	Data Record Information:
Interpolated Interior Style:	Reference Geometry Scalars

c) Additional information may be needed. Proposers should contact the registration authority. Contact information for this International Standard is maintained and available at www.iso.org/iso/en/prods-services/catalogue/maralist.html.

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Annex B
(informative)

Example forms for proposals and registered items

The following pages contain example proposal and register forms for:

a) the proposal of classes, the examples are LINETYPE and ESCAPE;

b) the establishment of specific items under a class, examples are LINETYPE dash-dotted-dotted and ESCAPE Set Dash;

c) the description of mappings and language bindings to extend existing standards.

These examples, in these cases for graphical items, are hypothetical and are included to illustrate the expectations for documentation which can be included with items registered according to the procedures of this standard. The “Relationship to particular standards” section shall be extended as standards are developed that apply to a registered item; this extension shall be done by the registration authority under the direction of ISO/IEC JTC 1/SC 24.

The particular forms that follow provide a progression of detail for the items being proposed.

1) Register Class – LINETYPE

2) Register Item – Class: LINETYPE: Item: dash-dotted-dotted

3) Register Class – ESCAPE

4) Register Item – Class ESCAPE: Item: Map DC Points to WC with attached mappings and language bindings

5) The Linetype and Escape Sections then define the means of integrating the registered items with each other.

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PROPOSAL FOR REGISTRATION OF ITEMS

Proposal Number:	

Sponsoring Authority:	
Class of Item:	LINETYPE
Name:	
Description	
Additional Comments	
Justification for Inclusion	
Relationship to Standards	

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered line type defined in subclause 5.4.1 of ISO 7942.

2) ISO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered line type defined in subclause 5.7.2 of ISO 8632-1.

3) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered line type defined in subclause 5.4.1 of ISO 8805.

4) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) functional description - Specifies a registered linetype defined in subclause 5.4.2 of ISO 9592-1.

5) ISO/IEC 9636:1991 Parts 1 - 6, Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered line type defined in subclause 5.3.2 of ISO 9636-3.

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PROPOSAL FOR REGISTRATION OF ITEMS

Proposal Number:	1

Date of Presentation:	3 June 1986

Sponsoring Authority:	DIN
Class of Item:	LINETYPE
Name:	dashed-dotted-dotted

Description

A repeating pattern of three line segments and three gaps, in which the first line segment is larger the second and third line segments and the second and third line segments are equal in length. The gaps are equal in length. The intended visual representation of this linetype is illustrated below.

Additional Comments

Justification for Inclusion

This linetype is already present in the CGM. The same linetype value should be registered for use by other graphical standards.

Relationship to Standards

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered line type defined in subclause 5.4.1 of ISO 7942.

2) ISO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered line type defined in subclause 5.7.2 of ISO 8632-1.

3) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered line type defined in subclause 5.4.1 of ISO 8805.

4) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) functional description - Specifies a registered linetype defined in subclause 5.4.2 of ISO 9592-1.

5) ISO/IEC 9636:1991 Parts 1 - 6, Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered line type defined in subclause 5.3.2 of ISO 9636-3.

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PROPOSAL FOR REGISTRATION OF ITEMS

Proposal Number:	

Date of Presentation:	

Sponsoring Authority:	
Class of Item:	ESCAPE
Name:	
Description	
Additional Comments	
Justification for Inclusion	
Relationship to Standards	

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered Escape as defined in e 5.2.

2) ISO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered escape defined in subclause 5.8.1

3) ISO/IEC 8651 (GKS Language Bindings) Specifies a registered escape.

4) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered escape as defined in subclause 4.13 of ISO/IEC 8805.

5) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 1: Functional description - Specifies a registered escape as defined in subclause 5.14 of ISO 9592-1.

6) ISO/IEC 9636-2:1991 Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered escape as defined in subclause 5.5.8 of ISO 9636-2.

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PROPOSAL FOR REGISTRATION OF ITEMS

Proposal Number:	119

Date of Presentation:	June 1, 1993

Sponsoring Authority:	ANSI
Class of Item:	ESCAPE
Specific Escape Function Identifier:	Map DC Points to WC

Description

This escape is used to map a collection of PHIGS DC points to WC values. This would frequently be used when a PHIGS application is displayed in a window system and input values are collected directly from the window system. Using the MAP WINDOW SYSTEM POINTS TO DC escape along with this escape allows an application to convert the window system coordinates into PHIGS view and WC values.

Additional Comments

This registered item is intended to be used with other registered items that supply functionality which allows PHIGS to operate in a window system. Those other items are MAP DC POINTS TO WINDOW SYSTEM COORDINATES, MAP WINDOW SYSTEM POINTS TO DC, REDRAW REGIONS, SET PICK MAPPING DATA, INQUIRE PICK MAPPING STATE, INQUIRE PICK MAPPING FACILITIES, MAP DC POINT TO PICK PATHS, and INQUIRE WINDOW SYSTEM COLOUR.

Justification for Inclusion

Many PHIGS applications are using window systems to obtain input values. The values must be mapped to PHIGS values. The capability to map DC values to WC is not included in PHIGS. This escape provides that mapping to PHIGS values.

Relationship to Standards

1) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 1: Functional description - Specifies a registered escape as defined in subclause 5.14 of ISO 9592-1.

2) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 1 FORTRAN - Specifies the FORTRAN syntax for a registered ESCAPE as defined in subclause 9.1.

3) ISO/IEC 9592-3:1990, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 3: Ada - Specifies Ada syntax for a registered ESCAPE as defined in subclause 5.13.

4) ISO/IEC 9592-4:1991, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 4: C - Functional description - Specifies C syntax for a registered ESCAPE as defined in subclause 3.6.

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Description:

The specified list of DC points is converted to world coordinate (*WC*) values and returned in mapped points. The same procedure used for PHIGS stroke input devices is used for this conversion. This is, the points are transformed to *normalized projection coordinates* by the inverse of the workstation transformation; the highest priority view containing all of the points is determined by searching the workstation's view table in view transformation input priority order, and the inverse view mapping and orientation transforms of that view are used to transfer the points to *WC*. The function returns the view index of the view used for the transformation.

This function is restricted to OUTPUT only workstations.

Relationship to particular standards:

1) PHIGS Functional Specification

(reference ISO/IEC 9592-1 PHIGS Functional specification)

A functional description of the parameters for this escape is given below:

Name	Values	Data Type
Input data record		WI
workstation identifiers		L(P3)
Output data record		
error indicator		I
view index	0..n	I
mapped points		L(P3)

Where the Input data record fields have the following meanings:

workstation identifier — the identifier of the workstation which shall be used for transformation information

DC points — the list of points, in PHIGS DCs, to be converted into WC values

The Output data record fields have the following meanings:

error indicator — the mapping can be computed, this value is returned as 0 and the mapping is returned in the other fields. If the mapping cannot be computed, this value indicates the reason for the error and the value of the other fields is implementation-dependent.

view index — the index of the view used when converting from *normalized projection coordinates to world coordinates*.

mapped points — the point list in *Wc*s

Error indicator values:

003 Ignoring function, function required state (PHOP,WSOP,.*)*
054 Ignoring function, the specified workstation is not open
xxx Ignoring function, specified workstation is not of category OUTPUT
xxx Ignoring function, one or more of the input points is outside the workstation window

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Map DC Points to WC2) PHIGS FORTRAN language binding(reference ISO/IEC 9593-1 PHIGS Language Bindings; Part 7: FORTRAN)The following language binding is for the “Pepqrs” form of the escape, as defined in subclause 9.1 of the PHIGS FORTRAN language binding (pqrs to be assigned by the Registration Authority to correspond to the assigned Register Identifier):

SUBROUTINE Pepqrs (WKID, N, DCPTS, ERRIND, VIEW, MPTS)

Input Parameters:INTEGER

WKID	Workstation identifierINTEGER
N	Number of pointsREAL(3*N)
DCPTS	DC point list ordered as: X1, Y1, Z1, X2, Y2, Z2,. . .
Xn, Yn,	ZnOutput Parameters:INTEGER
ERRIND	Error indicatorINTEGER
VIEW	View index used for transformationREAL(N)
PXA	The mapped X valuesREAL(N)
PYA	The mapped Y valuesREAL(N)
PZA	

The mapped Z values

The following parameters are for use when accessing this escape through the PESC function, as defined in subclause 9.14 of the PHIGS FORTRAN language binding:

Parameters used by the Pack Data Record function for the Input Data Record:

INTEGER	IL		
2	Number of integersINTEGER	IA(1)	
WKID	Workstation identifierINTEGER	IA(2)	
N	Number of pointsINTEGER	RL	
3*IA(2)	Number of rcalsREAL		
RA(1)	DC point list, X1REAL	RA(2)	DC point list, Y1REAL
RA(3)	DC point list, Z1REAL	RA(4)	DC point list, X2REAL
RA(5)	DC point list, Y2…REAL	RA(RL)	DC point list, ZnINTEGER
SL 0	Number of strings		

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Map DC Points to WC

Parameters returned by the Unpack Data Record function for the Output Data Record:

INTEGER	IL	2	Number of integers
INTEGER	IA(1)	ERRIND	Error indicator
INTEGER	A(2)	N	Number of points
INTEGER	RL	3*IA(2)	Number of reals
REAL	RA(1)	World Coordinate point list, X1	
REAL	RA(2)	World Coordinate point list, X2	
REAL	RA(3)	World Coordinate point list, X3	
REAL	RA(4)	World Coordinate point list, X4	
REAL	RA(RL)	World Coordinate point list, Zn	
INTEGER	SL	0	Number of strings

NOTE RA elements 1 through IA(2) contain the X components of the list, elements IA(2)+1 through 2*IA(2) contain the Ycomponents of the list and elements 2*IA(2)+1 through 3*IA(2) contain the Z components of the list.

3) PHIGS Ada language binding

(reference ISO/IEC 9593-3, PHIGS Language Bindings; Part 3: Ada)

Registered Escapes are in a library package named PHIGS_ESCAPE. The PHIGS Ada language binding also provides a data type package, PHIGS_TYPES which provides type declarations.

The following language binding is for the separate function form of the escape, as defined in subclause 5.13

of the PHIGS Ada language binding:

```
–

-- Escape function for MAP DC POINTS TO WC

--

with PHIGS_TYPES;

use PHIGS_TYPES;

package PHIGS_ESCAPE is

    procedure MAP_DC_POINTS_TO_WC

    (   WS : in WS_ID;

        DC_POINTS : in DC.POINT_LIST_3;

        ERROR_INDICATOR : out ERROR_NUMBER;

        VIEW_IND    : out VIEW_INDEX;
```

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```
        MAPPED_POINTS     : out WC.POINT_LIST_3)
    end PHIGS_ESCAPE;
```

Map DC Points to WC

4) PHIGS C language binding

(reference ISO/IEC 9593-4, PHIGS Language Bindings; Part 4: C)

a) The following language binding is for the separate function form of the escape, as defined in subclause of the PHIGS C language binding (PQRS to be assigned by the Registration Authority to correspond to the assigned Register Identifier):

```
void pescape_rPQRS(
        Pint            ws_id,          /* Workstation id          */
        Ppoint_list3    dc_points,      /* DC point list           */
        Pint            *crr_ind,       /* OUT Error indicator*/
        Pint            *view_index,    /* OUT View index          */
        Ppoint_list3    *mapped_points  /* OUT mapped points       */
```

b) The following types are for use when accessing this escape through the pescape function, as defined in subclause 3.6 of the PHIGS C language binding (PQRS to be assigned by the Registration Authority to correspond to the assigned Register Identifier):

```
typedef union {
            struct Pescape_in_rPQRS {
                Pint ws_id,                 /* Workstation id */
                Ppoint_list3    dc_points,  /* DC point list  */
            }  escape_in_rPQRS;
}  Pescape_in_data:

typedef union {
    struct Pescape_out_rPQRS {
                Pint  rr_ind,           /* Error indicator  */
                Pint  view_index,       /* View index       */
          Ppoint_list3      mapped_points,  /* mapped points    */
    }  escape_out_rPQRS;
}  Pescape_out_data:
```

NOTE The memory referenced by mapped points is managed by store.

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REGISTER OF ITEMS
Linetype Section

Linetype value:	
Name:	
Sponsoring Authority:	
Date of Registration:	
ISO Approval Date:	

Amendment Record:

Description

Relationship to Standards

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered line type defined in subclause 5.4.1 of ISO 7942.

2) ISO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered line type defined in subclause 5.7.2 of ISO 8632-1.

3) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered line type defined in subclause 5.4.1 of ISO 8805.

4) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) functional description - Specifies a registered linetype defined in subclause 5.4.2 of ISO 9592-1.

5) ISO/IEC 9636:1991 Parts 1 - 6, Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered line type defined in subclause 5.3.2 of ISO 9636-3.

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REGISTER OF ITEMS
Linetype Section

Register Identifier:	5
Date of Presentation:	3 June 1986
Sponsoring Authority:	DIN
Name:	dashed-dotted-dotted
Amendment Record:	

EXAMPLE

Description

A repeating pattern of three line segments and three gaps, in which the first line segment is larger than the second and third line segments and the second and third line segments are equal in length. The gaps are equal in length. The intended visual representation of this linetype is illustrated below.

Relationship to Standards

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered line type defined in subclause 5.4.1 of ISO 7942.

2) SO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered line type defined in subclause 5.7.2 of ISO 8632-1.

3) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered line type defined in subclause 5.4.1 of ISO 8805.

4) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) functional description - Specifies a registered linetype defined in subclause 5.4.2 of ISO 9592-1.

5) ISO/IEC 9636:1991 Parts 1 - 6, Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered line type defined in subclause 5.3.2 of ISO 9636-3.

Note This linetype is present in CGM as linetype 5.

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REGISTER OF ITEMS
Escape Section

Specific escape identifier:	
Escape name:	ESCAPE_
Sponsoring Authority:	
Date of Registration	
ISO Approval Date:	
Amendment Record:	

Description

Relationship to Standards

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered Escape as defined in e 5.2.

2) ISO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered escape defined in subclause 5.8.1

3) ISO/IEC 8651 (GKS Language Bindings) Specifies a registered escape.

4) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered escape as defined in subclause 4.13 of ISO/IEC 8805.

5) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 1: Functional description - Specifies a registered escape as defined in subclause 5.14 of ISO 9592-1.

6) ISO/IEC 9636-2:1991 Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered escape as defined in subclause 5.5.8 of ISO 9636-2.

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REGISTER OF ITEMS
Escape Section

Specific escape identifier:	1
Escape name:	Set Dash
Sponsoring Authority:	ANSI
Date of Registration	June 27,1991
ISO Approval Date:	July 1990
Amendment Record:	

EXAMPLE

Description

This escape function set the characteristics of the user-specified (registered) linetype. Such a user-specified dash pattern line consists of alternating dashes and spaces. This escape function allows a user to exercise precise control over important aspects of the appearance of lines of this type. This control includes the ability to select the length of each dash and of each space, the offset to tue start of the “dash pattern”, and whether the dash pattern is restarted at each portion of a primitive. In addition, linecap, line join, and mitre limit-each of which can be set by a registered escape function - apply to primitives of this linetype.

See attached sheet for additional details.

The default value for “continuity” is “restart”.

Relationship to Standards

1) ISO/IEC 7942:1985, Information processing systems - Computer graphics - Graphical Kernel System (GKS) functional specification - Specifies a registered Escape as defined in e 5.2.

2) ISO/IEC 8632-1:1992, Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part I: Functional specification (CGM) - Specifies a registered escape defined in subclause 5.8.1

3) ISO/IEC 8651 (GKS Language Bindings) Specifies a registered escape.

4) ISO/IEC 8805:1988, Information processing systems - Computer graphics - Graphical Kernel System for 3D (GKS-3D) functional description - Specifies a registered escape as defined in subclause 4.13 of ISO/IEC 8805.

5) ISO/IEC 9592-1:1989, Information processing systems - Computer graphics - Programmer’s Hierarchical Interactive Graphics System (PHIGS) - Part 1: Functional description - Specifies a registered escape as defined in subclause 5.14 of ISO 9592-1.

6) ISO/IEC 9636-2:1991 Information technology - Computer graphics - Interfacing techniques for dialogues with graphical devices (CGI) - Functional specification - Specifies a registered escsape as defined in subclause 5.5.8 of ISO 9636-2.

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Description

Set Dash controls the dash pattern used with line primitives of registered linetype "user-specified dash pattern" (linetype TBD). If the array of *dash pattern lengths* is empty (i.e., the *number of lengths* is zero), the linetype is equivalent to solid. This is the default value. If the array of *dash pattern lengths* is not empty, line primitives of registered linetype 'user-specified dash pattern" arc drawn with dashes whose pattern is defined by the array of lengths.

Each length in the array of dash pattern lengths must be non-negative. If any length in the dash pattern length array is negative, a length of zero shall be substituted. At least one length in the array must be non-zero. If all lengths are zero, the linetype is equivalent to solid. If the number of lengths is less than zero, a value of zero shall be substituted.

The elements of die array of *dash pattern lengths* are interpreted in sequence as distances along the primitive. These distances alternately specify the length of a gap between dashes. The contents of the array are used cyclically, that is when the end of the array is reached, the pattern starts over at the beginning.

Dashed lines wrap around curves and comers just as solid lines do. The ends of each dash receive no special treatments. In particular, the "ends" of dashes are not treated with current line cap. No measures other than *continuity* as described below, are provided to coordinate the dash pattern with features of an output primitive.

The offset value may be thought of as the 'phase" of the dash pattern relative to the start of the path. It is interpreted as a distance into the dash pattern at which the pattern should be started. Before beginning output of the dash pattern, the elements of the array of *dash pattern lengths* are cycled through, and the distances of alternating dashes and gaps added up, but without generating any output. When the *offset* distance into dash pattern has been reached, the primitive is drawn (from its beginning) using the dash pattern from the point that has been reached. If the offset is greater than the total length (the sum of all lengths in the dash pattern length array), the lengths in the array shall be re-cycled from the beginning. This process shall be repeated as many times as necessary until the offset distance is reached.

When *continuity* is set to *restart,* each portion of a primitive (e.g. each line segment within a polyline) is treated independently; i.e. the dash pattern is restarted (and *offset* applied) at the beginning of each portion. When *continuity* is set to *continuous,* the dash pattern is not restarted in going from one portion of a primitive to the next. If continuity is not either restart or continuous, the default value of restart shall be used.

Relationship to particular standards:

1) CGM Functional Specification (reference ISO 8632 CGM;

Part 1: Functional Description)

The elements of the array of dash pattern lengths are interpreted in sequence as distances in VDC units along the primitive. The offset value is in VDC units. A functional description of the Set Dash escape parameters is:

Parameters:

escape identifier (I) — value is 1 as assigned by the Registration Authority

data record (D):

IX: 1

continuity

VDC: n+I

offset (1)

lengths (n)

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Data Record Description:

The following continuity types are assigned:

6) restart

7) continuous

CGM Encodings (reference ISO 8632 CGM; Parts 2,3,4)

Each data record as whole is treated as a string in the CGM encoding being used. The content of the data record is encoded as a group of subsequences of parameters of a given data type. Each such subsequence is introduced by a header consisting of two items: the first is of data type Index (IX), indicating the data type for the parameters in the subsequence; the second is an Integer (I) count for the number of following parameters of that type. The header is encoded in accordance with the current precision for Index (IX) and Integer (I). The following parameters are encoded in the usual manner according to the encoding rules for parameters of the specified type. In particular, data types subject to type, precision, or a specification mode are encoded in accordance with the prevailing values for the relevant controls.

The data type index assignments for data types for CGI and CGM are:

1: Data Record (D)
2: Colour Index (CI)
3: Colour Direct Value (CD)
4: Client Specified Name (CSN)
Name(N)
5: Enumerated (E)
6: Integer (I)
7: Input Colour Specifier (ICO)
8: fixed 8-bit Integer (IF8)
9: Fixed 16-bit Integer (IF16)
10: Fixed 32-bit Integer (IF32)
11: Index (IX)
12: Real (R)
13: String (S)
14: Fixed String (SF)
15: Viewport Coordinate (VC)
16: Virtual Device Coordinate (VDC)

This list includes additional data type assignments that are added for completeness.

3) **GKS Functional Specification** (reference ISO 7942 GKS Functional Description)

The set dash escape is applicable at GKS level 0a and above. A functional description of its parameters is given below:

Name	**Values**	**Data Type**	**Range**
escape function identifier	1	N	
input data record:			
continuity (RESTART, CONTINUOUS)		E	
Offset	WC	R	
number of lengths		I	>=1
dash pattern lengths			
Array	WC	nxR	
output data record:			
None			

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Errors:

8 GKS not in proper state: GKS shall be in one of the states GKOP,WSOP,WSAC, or SGOP

4) GKS FORTRAN language binding (reference ISO/IEC 8651-1, GKS Language Bindings;Part 1: FORTRAN)

a) The following language binding is registered for the "GEpqrs" form (as defined in subclause 9.1 of the GKS FORTRAN language binding) of the escape:

SUBROUTINE GE1(CONT, OFFSET, DIMLEN, LEN)

Input Parameters:

INTEGER CONT	continuity (RESTART, CONTINUOUS)
REAL OFFSET	offset into dash pattern
INTEGER DIMLEN	dimension of the dash pattern lengths array
REAL LEN(DIMLEN)	dash pattern lengths array

Output Parameters:

NONE

The following mnemonic FORTRAN names and their values for GKS ENUMERATION type values are added to the list in the GKS FORTRAN binding:

continuity indicator	restart,	continuous
INTEGER	GREST,	GCONT
PARAMETER	(GREST=0,	GCONT=1)

The following parameters are registered for use when accessing this escape through the GESC function of subclause 9.3 of the GKS FORTRAN language binding standard:

Parameters used by the Pack Data Record function for the Input Data Record:

INTEGER IL	2
INTEGER IA(1)	continuity (RESTART, CONTINUOUS)
INTEGER IA(2)	number of dash pattern lengths
INTEGER RL	1+number of dash pattern lengths
REAL RA(1)	offset
REAL RA(2)	first length
REAL RA(3)	second length
…	
REAL RA(1 + number of dash pattern lengths)	last length
INTEGER SL	0

The Unpack Data Record function is not required by this escape.

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5) Pascal language binding (reference: ISO/IEC 8651-2, GKS Language Bindings; Part 2: Pascal)

The following Pascal language binding is registered for the procedure “GEscape” as defined in subclause 6.2 of the GKS Pascal language binding:

```
GEscapeContinuity = (GVEscapeRestart, GVEscapeContinuous);

GREscapeDataIn = RECORD
            CASE EscapeId: GTEscapeDataTag of  1:(
                    R0001Offset                 :REAL
                    R0001Continuity             :GEscapeContinuity;
                    R0001NumberLengths          :INTEGER;
                    R0001Lengths                :REAL array [1..MAX]);
                END;
GREscapeDataOut = Record

                CASE EscapeID : GTEscapeDataTag of
                1: ( ) ;      (*Null Record*)
            END;
```

6) GKS Ada language binding (reference ISO/IEC 8651-3 GKS Language Bindings; Part 3: Ada)

Registered ESCAPE’s are in a library package named GKS_ESCAPE. GKS Ada provides a data type package, GKS_TYPES which provides type declarations.

The binding for the “procedure SET_DASH” form (as defined in subclause 4.1 of the GKS Ada language binding) of the ESCAPE is:

— Escape function for a user specified dash pattern.

— Data types ESCAPE_ID and ESCAPE_FLOAT are defined in package

— GKS_ESCAPE.

— Other data types are defined in package GKS_TYPES.

```
--

with GKS_TYPES;use GKS_TYPES;

package GKS_ESCAPE is

type OFFSET is ESCAPE_FLOAT;

type CONTINUITY_CHOICE is (RESTART,CONTINUOUS);

type DASH_PATTERN_LENGTHS_ARRAY is array

   (SMALL_NATURAL range <>)of ESCAPE_FLOAT:

type SET_DASH_DATA_RECORD(NUMBER_OF_LENGTHS:SMALL_NATURAL:=0)is

record
```


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```
    OFFSET

    :in ESCAPE_FLOAT;

    CONTINUITY                  :in CONTINUITY_CHOICE:

    DASH_PATTERN_LENGTHS        :in DASH_PATTERN_LENGTH_ARRAY
                                (1..NUMBER_OF_LENGTHS);


end record:

procedure SET_DASH(DASH_RECORD    :in SET_DASH_DATA_RECORD);

--

--more ESCAPE procedures can be inserted here

--end GKS_ESCAPE;
```

7) GKS C language binding (reference ISO/IEC 8651-4, GKS Language Bindings; Part 4: C).

a) The following language binding is registered for the field **escape_r1** of the Escape Input Data Record **escape_in_data** as defined in the function **gescape** (clause 7.2) and the data type **Gescape_in_data** (clause 5.3):

```
struct Gescape_in_r1 {              /*  Set Dash Escape Input Data Record   */
        enum Gcont_ind {            /*  continuity indicator                */
        GIND_REST,                  /*  restart                             */
          Gind_CONT,                /*  continuous                          */
        } cont_ind;
        Gfloat offset;              /*  offset into dash pattern            */
        Gint num_dash_pat_lengths;  /*  number of dash pattern lengths      */
        Gfloat *dash_pat_lengths;   /*  dash pattern lengths                */



}  escape_r1;
```

b) The Escape Output Data Record is empty. Hence for the output parameter **escape_out_data**, the field **escape_r1** is defined by:

```
struct Gescape_out_r1 {

        void            empty;          /*  empty data record */

} escape)r1;
```

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Annex C
(informative)

Language binding guidelines

This annex provides general guidelines to be used by sponsoring authorities in generating language bindings for GDP's and escapes. Language bindings for these classes cannot be generated *a priori* since parameter types are not known in advance. However, some general rules can be stated. Sponsoring authorities should also consult the current versions of the Abbreviation List and the Data Type List for each language. The Data Type Lists are found in the language binding documents of functional standards. The Abbreviation List and addenda to the Data Type Lists are maintained by ISO/IEC JTC 1/SC 24 to reflect additions due to registered items. Copies of the Abbreviation List and Data Type List Addenda can be obtained from the Registration Authority. In addition, language specific guidelines for generating bindings are included in each language binding part of standards developed by ISO/IEC JTC 1/SC 24. Non-compliance with the guidelines in this annex or in the language binding documents, or incorrect use of abbreviations or data types may result in rejection of an item proposed for registration.

The guidelines are:

a) Consistent abbreviations are required for all registered items. The Abbreviation List should be used for developing the names of functions and enumerated types.

b) The language-independent specification of parameters for the registered item must apply information similar to that provided for parameters in the functional description standards. This information is:

   1) input or output (where appropriate);

   2) parameter name;

   3) type of parameter;

   4) range of values (where appropriate).

c) The registered parameters should be bound to appropriate data types if possible, referring to the binding of the functional standard and the Data Type List Addendum for the appropriate language. If no matching data type is defined, a new data type may be described. Upon approval of the item for registration, this new data type shall be added to the Data Type List Addendum by ISO/IEC JTC 1/SC 24.

d) In languages where range restrictions can be embodied in the type definition, the subrange specified in the language-independent description should be used.

e) Names for enumeration types should be chosen as follows:

   1) Use an appropriate to be consistent with matching enumeration types in the functional standard.

   2) If no appropriate enumeration type exists, either in the functional standard or the Data Type List (added as a result of previous registration), the sponsoring authority shall propose a new enumeration type based on the one specified in the language independent description of the item. This process may expand the ranges of enumerated data types.

f) Where records are used, components should be named using corresponding names from appropriate language binding or from the register.

g) Where a parameter type appears in a list of unknown length in a registered item and there is no corresponding list in the functional standard itself, use the mechanism employed in the language binding.

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h) Complex data structures are allowed in a registered item. In the language-independent definition, they must be expressed in the same way as in the standard, with the addition of parentheses to make priority clear.

   For example: nX(I;n X (4 X R))

The method of constructing such a complex structure in each language binding is determined when the first such structure is registered. Use serifed fonts for formulas and code.

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Annex D
(informative)

Encoding guidelines

This annex provides general guidelines to be used by sponsoring authorities in generating encodings for GDP's and escapes. Encodings for these classes cannot be generated a priori since parameter types are not known in advance. However, some general rules can be stated. Sponsoring authorities should also consult the current versions of the Abbreviation List and the Data Type List for each encoding. The Data Type Lists are found in the encoding documents of functional standards. The Abbreviation List and addenda to the Data Type Lists are maintained by ISO/IEC JTC 1/SC 24 to reflect additions due to registered items. Copies of the Abbreviation List and Data Type List Addenda can be obtained from the Registration Authority. In addition, specific guidelines for generating encodings are included in each language binding part of standards developed by ISO/IEC JTC 1/SC 24. Non-compliance with the guidelines in this annex or in the encoding documents, or incorrect use of abbreviations or data types may result in rejection of an item proposed for registration.

The guidelines are:

a) Consistent abbreviations are required for all registered items. The Abbreviation List should be used for developing the names of functions and enumerated types.

b) The encoding independent specification of parameters for the registered item must apply information similar to that provided for parameters in the functional description standards. This information is:

    1) input or output (where appropriate);

    2) parameter name;

    3) type of parameter;

    4) range of values (where appropriate).

c) The registered parameters should be bound to appropriate data types if possible, referring to the encoding of the functional standard and the Data Type List Addendum for the appropriate encoding. If no matching data type is defined, a new data type may be described. Upon approval of the item for registration, this new data type shall be added to the Data Type List Addendum by ISO/IEC JTC 1/SC 24.

d) In encodings where range restrictions can be embodied in the type definition, the subrange specified in the encoding independent description should be used.

e) Names for enumeration types should be chosen to be consistent with matching enumeration types in the functional standard. If no appropriate enumeration type exists, either in the functional standard or the Data Type List (added as a result of previous registration), the sponsoring authority shall propose a new enumeration type based on the one specified in the encoding independent description of the graphical item. Upon approval of the item for registration, this new data type shall be added to the Data Type List Addendum by ISO/IEC JTC 1/SC 24.

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Example:

Use of an existing enumeration type should be used if appropriate. For example, an enumeration type for visibility in the escape SET BIT PLANE VISIBILITY could use the values (INVISIBLE, VISIBLE) as used by the visibility enumeration type in the CGI function EDGE VISIBILITY.

f) Complex data structures are allowed in a register item. In the encoding definition, they must be expressed in the same way as in the standard, with the addition of parentheses to make priority clear.

Example: 3x(1,2R).

The methods for constricting such a complex structure in each encoding is determined when the first such structure is registered.

g) If the GDP or escape registered item contains a data record, the following text must be included in the specification of the encodings:

"Each data record as a whole is treated as a string (a series of octets) in the encoding being used. The content of the data record is encoded as a group of subsequences of parameters of a given type. Each such subsequence is introduced by a header consisting of two items:

1) the data type Index (IX), indicating the data type for the parameters of a given type;

2) the Integer (I) count for the number of following parameters of that type.

The header is encoded in accordance with the current precision for Index (IX) and Integer (I). The following parameters are encoded in the usual manner according to the encoding rules for parameters of the specified type. In particular data types subject to type, precision, or a specification mode are enclosed in accordance with the current values for the relevant controls in effect."

The data type assignments for data types used for data record parameters are:

1: D (data record),
2: CI (colour index),
3: CD (direct colour),
4: CSN;N (client specified name; name),
7: ICO (input colour),
8: IF8 (8-bit signed integer),
9: IF16 (16-bit signed integer),
10: IF32 (32-bit signed integer),
11: IX (index),
12: R (real),
13: S (string),
14: SF (fixed representation string),
15: VC (viewport coordinate),
16: VDC (virtual device coordinate),
17: CCO (colour component),
18: UI8 (unsigned 8-bit integer),
19: UI32 (unsigned 32-bit integer),
20: BS (bitstream),
21: CL (colour list),
22: UI16 (unsigned 16-bit integer)

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h) A recommended method for specifying the parameters of a data record in the specification of a registered item is shown in the following example for a data record *containing* four real *values* and two VDC values:

Example of a data record containing a transformation matrix data record (D):

R:	4
	x scale component
	x rotation component
	y rotation component
	y scale component
VDC:	2
	x translation component
	y translation component

Additional data types used for data record parameters may be identified in the ISO graphics standards.

The most recent list is available from the Registration Authority.

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