International Standard

ISO 14823-1

Intelligent transport systems — Graphic data dictionary —

Part 1:
Specification

Systèmes de transport intelligents — Dictionnaire de données graphiques —

Partie 1: Spécification

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces the first edition (ISO 14823:2017), which has been technically revised.

The main changes are as follows:

— the mechanism of "relative object identifier" has been specified (7.3);

— the inclusion of up to 4 pictograms in the graphic data dictionary (GDD) has been allowed;

— redundant pictogram codes have been deleted;

— new pictogram codes requested by certain countries have been added;

— new attributes to comply with new signs have been added;

— redundant attributes have been deleted;

— existing attributes have been changed to be more flexible and to be harmonized with existing International Standards.

A list of all parts in the ISO 14823 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 Design principle

This document specifies a graphic data dictionary (GDD) that has been developed with the intent of creating a common basis for transmitting encoded information for existing road traffic signs and pictograms. The coding system has been developed to be language-independent, such that data that can be interpreted, irrespective of language or regional differences. The GDD supports intelligent transport system (ITS) application such as in-vehicle signage or in-vehicle information.

This document supports:

— the efficient IT-centric encoding for ITS messaging to represent specific road traffic signs and pictograms, and

— the consistent decoding of encoded road traffic signs and pictogram data for display in ITS.

This document can support the translation of signs and pictograms with a similar purpose from the representation used in one country to the representation used in another country.

Existing road traffic signs and pictograms from various countries are listed in Annex I.

0.2 Background of revision

The first edition of this document (ISO 14823:2017) used the country codes stipulated by ISO 3166-1 to distinguish the country where the GDD is provided and used the following numbering structure to identify the pictogram codes stipulated in Clause 8.

— The two-digit category of the sign.

— The one-digit nature of the sign.

— The two-digit serial number of the sign.

However, this mechanism lacked a global identification of pictogram codes and a flexibility when adding new pictogram codes.

To cope with these issues, the present document, ISO 14823-1:2023, has been developed.

0.3 Backward compatibility

This document has been developed to be backward compatible with ISO 14823:2017 to assist in transitions from earlier implementations, while not hindering spreads of ISO 14823:2017 and being able to support many new features.

Specifically, the GDD allows the selection of two versions described in 7.1. The GDD allows the use of the ASN.1 description specified in Annex A or Annex E, and allows the use of the attributes specified in Annex B or Annex F.

Intelligent transport systems — Graphic data dictionary —

Part 1:
Specification

1 Scope

This document specifies a graphic data dictionary (GDD), a system of standardized codes for existing road traffic signs and pictograms used to deliver traffic and traveller information (TTI). The coding system can be used in the formation of messages within intelligent transport systems (ITS).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country code*

ISO 8601-1:2019, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1) — Part 1: Specification of basic notation*

ISO/IEC 8825-5:2021, *Information technology — ASN.1 encoding rules — Part 5: Mapping W3C XML schema definitions into ASN.1*

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

ISO/IEC 19505-1, *Information technology — Object Management Group Unified Modeling Language (OMG UML) — Part 1: Infrastructure*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
attribute
coded information which can be associated to a *pictogram* (3.5) in order to clarify the meaning of the pictogram

3.2
country code
internationally recognized codes

Note 1 to entry: When referring to countries and subdivisions of countries, the description in ISO 3166-1:2020, 3.3 applies.

3.3
graphic data dictionary
catalogue of codes for *pictograms* (3.5) organized systematically

3.4
nature category number
number to identify the nature of the *pictogram category code* (3.7)

3.5
pictogram
graphic or icon on static signs or rendered on a display of an IT system, such as a monitor or a VMS pictogram display, to inform travellers of information such as road conditions, traffic elements, traffic regulations or public facilities

3.6
pictogram code
combination of a *service category code* (3.11) and a *pictogram category code* (3.7) optionally including a *country code* (3.2) in version 1

Note 1 to entry: See 7.1 for an explanation of "version 1".

3.7
pictogram category code
code assigned to a set of *pictograms* (3.5) conveying the same meaning for a given *service category code* (3.11)

3.8
qualifier
parameter for an *attribute* (3.1) used to express the meaning of *pictogram* (3.5) quantitatively

3.9
relative object identifier
value which identifies an object by its position relative to some known object identifier

[SOURCE: ISO/IEC 8824-1:2021, 3.8.63]

3.10
serial number
number to identify the *pictogram* (3.5) belonging to the nature category

3.11
service category code
code assigned to distinguish the service category such as a regulation or public facilities

3.12
specialization
relationship between a more general class (the parent) and a more specific class (the child) that is fully consistent with the general class and that adds additional information

[SOURCE: ISO/IEC 11179-3:2023, 3.1.8, modified — "<metamodel>" preceding the definition has been deleted. Notes to entry have been removed.]

4 Abbreviated terms

ASN.1   Abstract Syntax Notation One

C-ITS   cooperative intelligent transport systems

HGV   heavy goods vehicle

ITS   intelligent transport systems

IT   information technology

LPG   liquefied petroleum gas

OID   object identifier

UML   unified modeling language

UN   United Nations

VMS   variable message sign

5 Conformance

An implementation is conformant with this document when the following conditions are met.

— The implementation and transmission of graphic data shall conform to the requirements listed in this document.

— The pictogram code shall be selected from the categorized codes listed in this document.

6 Requirements

The intended usage of this document is to support the efficient IT-centric encoding for ITS messaging to represent specific road traffic signs and pictograms and the consistent decoding of encoded road traffic signs and pictogram data for display in ITS.

This document can support the translation of signs and pictograms with similar purpose from the representation used in one country to the representation used in another country. For illustrative purposes, it is foreseen that this document will be able to be used to encode information concerning a specific pictogram that is then embedded into other information to be exchanged; if needed, on receipt of this information, the receiver will be able to use the contents of this document to decode the information concerning the specific pictogram to support its display across a range of dissemination systems. Examples of these dissemination systems can include: traffic control centre system user interfaces, variable message signs (VMS). public access terminals, mobile personal information systems, and on-board units.

Requirements for ITS applications which utilize the GDD are as follows.

— Graphic data shall consist of a version number, relative object identifier or country code and optionally an attribute indicator.

— The pictogram code shall be decided based on Table 1.

— The danger warning pictogram code shall be selected from Table 3.

— The regulatory pictogram code shall be selected from Table 4.

— The informative pictogram code shall be selected from Table 5.

— The public facilities pictogram code shall be selected from Table 6.

— The supplementary panel and additional panel pictogram code shall be selected from <u>Table 9</u>.

— The integer value which indicates the direction shall be determined based on <u>Table B.3</u> or <u>Table F.3</u>.

— If attribute indicator is on, graphic data shall include attributes listed in <u>Table B.1</u> or <u>Table F.1</u>.

— When transmitting graphic data, it shall be coded based on the ASN.1 module specified in <u>Annex A</u> (version 2) or on the ASN.1 module specified in <u>Annex E</u> (version 1).

NOTE   For transmission efficiency purposes, compression can be considered. This is outside the scope of this document.

7   Structure of pictogram code

7.1   General

The GDD provides a taxonomy of all registered sign types by assigning each sign type with a globally unique pictogram code. This pictogram code allows the meaning of virtually any sign used for surface transport to be adequately conveyed in a language-independent manner with a very short identifier coupled with optional attributes.

There are two "versions" available for determining the structure of the pictogram code.

The first version (referred to collectively as "version 1") uses the sequence of the country code (see <u>7.4</u>) and pictogram code (see <u>7.5</u>) as specified by the GDD structure in <u>Annex E</u>.

Version 1 is expected to be used mainly when expanding or maintaining the existing C-ITS applications which presently use GDD (i.e. ISO 14823:2017).

The second version (referred to collectively as "version 2") uses the object identifier of the pictogram code by using the ASN.1 relative object identifier specified in <u>7.3</u>. This mechanism has been introduced to cope with a global identification of pictogram codes and a flexibility when adding new pictogram codes.

Version 2 allows to the inclusion of up to 4 pictograms in the GDD.

In addition, some elements have been harmonized with DATEX II to be used in VMS signs.

It is up to each application or service to determine how to use these versions.

However, for reasons of facilitating implementations, it is recommended to avoid mixing versions in the same application or service.

Version 1 and version 2 are maintained independently by introducing the notion of "revision" in complement of the notion of "version". Both the version and the revision are identified in the object identifier (OID) that identifies the respective ASN.1 module.

Details of version 2 can be found in <u>Annexes A</u>, <u>B</u>, <u>C</u> and <u>D</u> while details of version 1 can be found in <u>Annexes E</u>, <u>F</u> and <u>G</u>.

7.2   Current and deprecated signs

There are a number of signs in ISO 14823:2017 that are deprecated (no longer relevant or duplicated). Each pictogram code of the GDD in this document (ISO 14823-1:2023) is labelled "current" or "deprecated" together with a date of revision. Using this labelling enables legacy applications to continue to use these deprecated sign codes but signals to new users that it is wise to use only current labelled codes. To ensure backward compatibility, no code is reused, so that if a deprecated code is transmitted and the receiver does not recognize it, no action is taken. In the future it is possible that some codes might be set to "obsolete".

The following are examples of deprecated signs and reasons for deprecation.

— Signs listed in [Table 7](#) and [Table 8](#) have been deprecated and moved to [Table 3](#) as these signs should be used in dangerous situations.

— Signs listed in [Table 4](#) (from pictogram category no. 631 to no. 637) have been deprecated as these signs should be presented using attributes.

— Signs listed in [Table 4](#) (from pictogram category no. 365 to no. 368) have been deprecated as these signs are replaced by signs listed in [Table 4](#) (from pictogram category no. 361 to no. 364).

7.3   Relative object identifier

The international object identifier tree as defined in ISO/IEC 9834-1 is a tree whose root corresponds to this document and whose nodes correspond to Registration Authorities responsible for allocating arcs from a parent node.

The pictogram codes are registered on the international object identifier tree under the arc {joint-iso-itu-t(2) its(28) gdd(5) }. The first three sub-arcs follow the numbering structure:

— the two-digit service category of the sign,

— the one-digit nature category of the sign,

— the two-digit serial number of the sign.

The taxonomy specified by the GDD allows maximum interoperability among implementations that might differ in their level of support of GDD details. In other words, while the GDD has been designed to support numerous potential use cases that require various levels of detail and virtually all sign types that might be encountered within surface transport, the GDD has also been designed to accommodate applications (especially receiving applications) that might not support the full scope of the GDD. Specifically, the taxonomic structure of the GDD allows a sender to provide a very detailed pictogram code; if the receiver does not understand the complete taxonomic sequence, it should still be able to classify the sign under a parent category (or understand that it is safe to ignore).

For example, if a receiving application is notified of a sign with an object identifier of {joint(2) its(28) gdd(5) warning(11) warning3(3) wildAnimal(63) unspecified(0) au(36) kangaroo(x) }), it might be able to display the intended Australian-specific kangaroo crossing warning sign to the driver. Another application might generalize all object identifiers starting with {joint(2) its(28) gdd(5) warning(11) warning3(3) wildAnimal(63) } sign to a generic wild animal crossing sign. Another application might generalize all object identifiers starting with {joint(2) its(28) gdd(5) warning(11) } to be a generic warning sign. The level of detail supported by an application is dependent upon the purpose of the receiving application and is beyond the scope of the GDD.

To ensure that all signs described by the GDD are placed into this taxonomy, the GDD conveys the object identifier of the pictogram code by using the ASN.1 relative object identifier type with a root node of {joint(2) its(28) gdd(5) }. This allows a more efficient encoding of the object identifier while also ensuring that all codes can be generalized according to the specified taxonomy. This structure still allows for further regional specializations of the pictogram code specified within this standard according to the process specified [Annex D](#).

7.4   Country code

ISO 3166-1 shall be used to encode the countryCode in GddStructure.pictogramCode using two-letter codes in upper case in accordance with ISO/IEC 8859-1 encoding. For example, if the on-board unit has multiple countries' pictograms, it can render a pictogram on the display in accordance to each county code when the traveller is driving through adjacent countries.

If present, the component countryCode in GddStructure.pictogramCode (version 1) shall contain a two-letter country code that shall conform to ISO 3166-1, in upper case.

7.5 Pictogram code and object identifier (OID) node information

The structure of the pictogram code including the relative object identifier is presented in Table 1. The service category has following four types of categories.

1) Traffic signs: are officially established pictograms in each country to control traffic using a warning, regulatory or informative sign.

2) Public facilities: indicate the existence of certain public facilities and their service details (e.g. toilets, restaurants, first aid facilities, etc.).

3) Ambient conditions: indicate weather condition on the road (e.g. rainfall, flood, fog, etc.) and road conditions (traffic congestion, accident, etc.) which can potentially affect the traffic flow.

4) Supplemental panels: are attached to the main signs to provide supplemental information using text or numbers.

> NOTE   Users of version 2 are encouraged to use attributes instead of supplemental panels where it is possible.

Each pictogram category code has a nature category number and a serial number.

Pictograms to be used for information display may vary from country to country, political jurisdiction to political jurisdiction, or system operator to system operator.

Pictogram codes and OID node information are described in Annex J.

Table 1 — Pictogram code (for version 1 omitting country code) and relative object identifier

Pictogram code				Relative object identifier
Service category code		Pictogram category code		
Main category	Sub-category	Nature category number	Serial number	
trafficSign (1)	dangerWarning (1)	warning1 (1)	xx	{11 1 xx}
		warning2 (2)	xx	{11 2 xx}
		warning3 (3)	xx	{11 3 xx}
		warning4 (4)	xx	{11 4 xx}
		warning5 (5)	xx	{11 5 xx}
		warning6 (6)	xx	{11 6 xx}
		warning7 (7)	xx	{11 7 xx}
		warning8 (8)	xx	{11 8 xx}
		warning9 (9)	xx	{11 9 xx}
	regulatory (2)	priority1 (1)	xx	{12 1 xx}
		priority2 (2)	xx	{12 2 xx}
		priority3 (3)	xx	{12 3 xx}
		prohibitionOrRestriction (4)	xx	{12 4 xx}
		prohibitionOrRestriction (5)	xx	{12 5 xx}
		prohibitionOrRestriction (6)	xx	{12 6 xx}
		mandatory (7)	xx	{12 7 xx}
		mandatory (8)	xx	{12 8 xx}
		mandatory (9)	xx	{12 9 xx}
	Informative [3]	advanceDirection1 [1]	xx	{13 1 xx}
		advanceDirection1 [2]	xx	{13 2 xx}
		advanceDirection1 [3]	xx	{13 3 xx}
		Instruction [1]	xx	{13 4 xx}
		Notification [1]	xx	{13 5 xx}
		laneGuidance [1]	xx	{13 6 xx}
		alert	xx	{13 7 xx}
		roadOrPlaceIdentification1 [1]	xx	{13 8 xx}
		roadOrPlaceIdentification2 [2]	xx	{13 9 xx}
publicFacilities [2]	publicFacilities [1]	publicFacilitiesAndServices1 [1]	xx	{21 1 xx}
		publicFacilitiesAndServices1 [2]	xx	{21 2 xx}
ambientConditions [3]	ambientConditions [1]	ambientConditions1 [1]	xx	{31 1 xx}
		ambientConditions1 [2]	xx	{31 2 xx}
	roadConditions [1]	roadConditions [1]	xx	{32 1 xx}
supplementaryPanel [4]	supplementaryPanel [1]	supplementaryPanel [1]	xx	{41 1 xx}

An additional (or supplementary) panel is a device placed below (sometimes above) a road sign to make the meaning of the sign or symbol more explicit or to limit the application of the sign to certain periods. It can also be used to show the distance from the sign to the beginning of the dangerous section of road or of the zone to which the regulation applies, or to show the length of the dangerous section of road or of the zone to which the regulation applies.

If regulatory signs are to be restricted to certain road users or if certain road users are to be exempt from the regulation, this is done through the same device.

8   Numbering of pictogram codes

8.1   General

The GDD specifies the pictogram code and the rule for generating a mnemonic associated with each pictogram code.

In the following tables starting from 2 pictograms codes may also be given a country code in version 1 according to the specifications of this document.

The status of pictograms code is labelled "C" (=current) or "D" (=deprecated) in the following tables.

8.2   Mnemonic of the pictogram code

A mnemonic of the pictogram code can be generated by transforming each pictogram code name specified in the following subclauses in accordance with the following rules.

— In lower CamelCase notation

— The ASN.1 rules which shall be in accordance with ISO/IEC 8824-1 (e.g. no spaces, no parenthesis)

— No articles (the, a, an)

Table 2 — Examples of mnemonic

Pictogram code		Pictogram code name	Mnemonic
Service category code	Pictogram category code		
11	111	Intersection where the priority is prescribed by the general priority rule (Crossroads)	intersectionWherePriorityIsPrescribedByGeneralPriorityRuleCrossroads
	114	Forked (off to upper right) intersection where the priority is prescribed by the general priority rule	forkedOffToUpperRightIntersectionWherePriorityIsPrescribedByGeneralPriorityRule
	116	Intersection where the priority is prescribed by the general priority rule (T junction)	intersectionWherePriorityIsPrescribedByGeneralPriorityRuleTJunction)

8.3   Pictogram code (without country code) no. 11111 to no. 11999: Traffic sign pictograms (danger warning)

Pictograms falling under this category shall be used to give the road users advance warning for an adverse road condition, any hazards to safe driving, or any other conditions for which they should take notice.