
International Standard



646

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Information processing — ISO 7-bit coded character set for information interchange

Traitement de l'information — Jeu ISO de caractères codés à 7 éléments pour l'échange d'information

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 646 was developed by Technical Committee ISO/TC 97, *Information processing systems*, and was circulated to the member bodies in March 1982.

It has been approved by the member bodies of the following countries :

Belgium	Germany, F. R.	Romania
Canada	Hungary	South Africa, Rep. of
China	Ireland	Spain
Czechoslovakia	Italy	Sweden
Denmark	Japan	Switzerland
Egypt, Arab Rep. of	Netherlands	United Kingdom
Finland	Norway	USA
France	Poland	

No member body expressed disapproval of the document.

This second edition cancels and replaces the first edition (i.e. ISO 646-1973).

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Information processing — ISO 7-bit coded character set for information interchange

1 Scope and field of application

1.1 This International Standard specifies a set of 128 characters (control characters and graphic characters such as letters, digits and symbols) with their coded representation. Most of these characters are mandatory and unchangeable, but provision is made for some flexibility to accommodate national and other requirements.

1.2 This International Standard specifies a 7-bit coded character set with a number of options. It also provides guidance on how to exercise the options to define specific national versions and application-orientated versions. Furthermore it specifies the International Reference Version (IRV) in which such options have been exercised.

1.3 This character set is primarily intended for the interchange of information among data processing systems and associated equipment, and within data communication systems. The need for graphic characters and control functions in data processing has also been taken into account in determining this character set.

1.4 This character set is applicable to all alphabets of Latin letters.

1.5 This character set includes control characters for code extension where its 128 characters are insufficient for particular applications. Procedures for the use of these control characters are specified in ISO 2022.^[2]

1.6 The definitions of some control characters in this International Standard assume that data associated with them are to be processed serially in a forward direction. When they are included in strings of data which are processed other than serially in a forward direction or when they are included in data formatted for fixed-record processing they may have undesirable effects or may require additional special treatment to ensure that they result in their desired function.

2 Conformance and implementation

2.1 Conformance

A coded character set is in conformance with this International Standard if it is a version in accordance with clause 6. Equipment claimed to implement this International Standard shall be

able to interchange information by means of a version of the 7-bit coded character set, this version shall be identified in any such claim.

2.2 Implementation

The use of this character set requires definitions of its implementation in various media. For example, these could include punched tapes, punched cards, magnetic media and transmission channels, thus permitting interchange of data to take place either indirectly by means of an intermediate recording in a physical medium, or by local connection of various units (such as input and output devices and computers) or by means of data transmission equipment.

The implementation of this coded character set in physical media and for transmission, taking into account the need for error checking, is the subject of other International Standards (see the bibliography).

3 Definitions

For the purpose of this International Standard the following definitions apply.

3.1 bit combination : An ordered set of bits used for the representation of characters.

3.2 character : A member of a set of elements used for the organization, control or representation of data.

3.3 coded character set; code : A set of unambiguous rules that establishes a character set and the one-to-one relationship between the characters of the set and their bit combinations.

3.4 code extension : The techniques for the encoding of characters that are not included in the character set of a given code.

3.5 code table : A table showing the character allocated to each bit combination in a code.

3.6 control character : A control function the coded representation of which consists of a single bit combination.

3.7 control function : An action that affects the recording, processing, transmission or interpretation of data and that has a coded representation consisting of one or more bit combinations.

3.8 graphic character : A character, other than a control function, that has a visual representation normally handwritten, printed or displayed.

3.9 position : That part of a code table identified by its column and row co-ordinates.

4 Specification of the coded character set

The bits of the bit combinations of the 7-bit code are identified by $b_7, b_6, b_5, b_4, b_3, b_2$ and b_1 , where b_7 is the highest-order, or most-significant, bit and b_1 is the lowest-order, or least-significant, bit.

The bit combinations may be interpreted to represent integers in the range 0 to 127 in binary notation by attributing the following weights to the individual bits :

Bit :	b_7	b_6	b_5	b_4	b_3	b_2	b_1
Weight :	64	32	16	8	4	2	1

In this International Standard, the bit combinations are identified by notation of the form x/y , where x is a number in the range 0 to 7 and y is a number in the range 0 to 15. The correspondence between the notations of the form x/y and the bit combinations consisting of the bits b_7 to b_1 is as follows :

- x is the number represented by b_7, b_6 and b_5 where these bits are given the weights 4, 2 and 1 respectively;
- y is the number represented by b_4, b_3, b_2 and b_1 where these bits are given the weights 8, 4, 2 and 1 respectively.

The notations of the form x/y are the same as those used to identify code table positions, where x is the column number and y the row number (see clause 7).

The 128 bit combinations of the 7-bit code represent control characters and graphic characters. The allocation of characters to bit combinations is based on the following principles :

- the bit combinations 0/0 to 1/15 represent 32 control characters;
- the bit combination 2/0 represents the character SPACE, which is interpreted both as a control character and as a graphic character;
- the bit combinations 2/1 to 7/14 represent up to 94 graphic characters as one or more of these bit combinations may be declared to be unused (see 4.3);
- the bit combination 7/15 represents the control character DELETE.

The allocation of individual characters to the bit combinations of the 7-bit code is specified in 4.1, 4.2 and 4.3 below.

This International Standard assigns at least one name to each character. In addition, it specifies an acronym for each control character and for the character SPACE, and a graphic symbol for each graphic character. By convention, only capital letters and hyphens are used for writing the names of the characters, except for small letters. For acronyms only capital letters and digits are used. It is intended that the acronyms and this convention be retained in all translations of the text.

The names chosen to denote graphic characters are intended to reflect their customary meaning. However, this International Standard does not define and does not restrict the meanings of graphic characters. Neither does it specify a particular style or font design for the graphic characters when imaged.

4.1 Control characters

The control characters of the 7-bit coded character set are classified in the following categories :

- a) Transmission control characters
Transmission control characters are intended to control or facilitate transmission of information over telecommunication networks. Procedures for the use of the transmission control characters on telecommunication networks are the subject of other International Standards (see the bibliography).
- b) Format effectors
Format effectors are mainly intended for the control of the layout and positioning of information on character-imaging devices such as printing and display devices.
- c) Code extension control characters *shall be*
Code extension control characters ~~are~~ used to extend the character set of the code. They may alter the meaning of one or more bit combinations that follow them in the data stream. Procedures for the use of the code extension control characters are specified in ISO 2022.^[2]
- d) Device control characters
Device control characters are intended for the control of local or remote devices or ancillary devices connected to a data processing or data communication system. These control characters are not intended to control data communication systems; this should be achieved by the use of transmission control characters.
- e) Information separators
Information separators are used to separate and qualify data logically. There are four such characters. They may be used either in hierarchical order or non-hierarchically; in the latter case, their specific meanings depend on the application.
- f) Other control characters
These are the control characters that fall outside the preceding categories.

The composition of each category, and the allocation of the individual control characters in each category to bit combinations of the 7-bit code are specified in 4.1.1 to 4.1.6. Each of these sub-clauses contains a table consisting of three columns. The first column specifies the acronym of each control character,