INTERNATIONAL STANDARD

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# Information technology — Notation of format for data element values

*Technologies de l'information — Notation du format pour les valeurs des éléments de données*



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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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

This International Standard ISO/IEC 14957 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 14, *Data element principles.*



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## Introduction

Data interchange is experiencing rapid expansion, in the commercial, technical and public sectors. It gives rise to inter working between different communities which often have developed independently information processing applications and telecommunication networks which meet specific needs. Hence an overall situation which suffers from a lack of homogeneity.

In order to remedy this situation, an urgent standardization effort focused in particular on the representation of data elements is necessary.

The representation of a data element supposes in the first place that the format, i.e. the type of characters used in the representation and in the length of the latter is specified. So that these specifications have the same significance for everyone involved, it is necessary to express them in accordance with standardized conventions.

Such rules are likely to eliminate any and all risk of ambiguity, lack of understanding and error; they also facilitate the comparison of data element dictionaries, the design and creation of information systems as well as electronic data interchange (EDI).

These notations have been partially and variously expressed in different International Standards according to the specific contexts in which they have been defined, e.g. EDIFACT (ISO 9735), Banking Standards (as ISO 7982-1), Character sets (ISO 8859), Information processing (ISO 6093).

Therefore, the objective of this International Standard is to provide a unique source of reference on this issue for all Standards utilizing these type of notations independently of their environments.



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# Information technology — Notation of format for data element values

## 1 Scope

This International Standard specifies the notation to be used for stating the format, i.e. the character types used in the representation of data elements and the length of these representations. It also specifies additional notations relative to the representation of numerical figures.

The scope of this International Standard is limited to graphic characters as digits, letters and special characters. It does not cover control characters.

These rules are applicable wherever there is reason for specifying these characteristics. Applications include data elements dictionaries, the processing of information and EDI.

## 2 Normative References

The following standards contain provisions which, through reference in the text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2382-4:1987, *Information processing systems - Vocabulary - Part 04: Organization of data.*

ISO 6093:1985, *Information processing - Representation of numerical values in character strings for information interchange.*

ISO/IEC 11179-3:1994, *Information technology - Specification and standardization of data elements - Part 3: Basic attributes of data elements.*

IEC 1360-1:1995, *Standard data element types with associated classification scheme for electric components - Part 1: Definitions - Principles and methods.*

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 data element** : A unit of data for which the definition, identification, representation and permissible values are specified by means of a set of attributes (ISO/IEC 11179-3).

**3.2 character set** : A finite set of different characters that is complete for a given purpose (ISO 2382-4)

**3.3 character type** : A set of characters of the same kind or having the same use. Examples: letters, figures, special characters, etc.

**3.4 length (of representation)** : A number of characters used to represent a data element.



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## 4 Notation relative to character types and length of representation of a data element

The type and the number of characters shall be specified in order to represent a data element.

### 4.1 Character type notation

The following rules apply to printable character types used in the representation of data elements and defined in the ISO standards. The rules do not include communication control codes or field separators.

Character types are represented by the following notation.

#### 4.1.1 Normal types

A : Capital letters (A to Z)

a : Small letters (a to z)

n : figures (0 to 9)

#### 4.1.2 mixed types

Aa : Capital letters (A to Z) and/or small letters (a to z)

An : Capital letters (A to Z) and/or figures (0 to 9)

an : Small letters (a to z) and/or figures (0 to 9)

Aan : Capital letters (A to Z) and/or small letters (a to z) and/or figures (0 to 9)

#### 4.1.3 Extended types

This category concerns character sets extended to signs other than letters and figures which are standardized.

The following notation is used :

s: all permitted characters of an authorized set



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One of the following notation shall be used to specify the set to which it is referred to[1]:

sa: all permitted characters from the character set authorized by ISO 8859-1

sb: all permitted characters from the character set authorized by ISO 8859-2

sc: all permitted characters from the character set authorized by ISO 8859-5

sd: all permitted characters from the character set authorized by ISO 8859-7

### 4.2 Length

The length of a data element representation can be fixed or variable

#### 4.2.1 Fixed length

This notation expresses a fixed length by writing after the character type, without any space or intermediate character, the number of characters representing the data element.

EXAMPLES :

a3 : Fixed length of 3 small letters

n6 : Fixed length of 6 figures

#### 4.2.2 Variable length

A variable length is expressed by writing two dots: ".." after the indication of the type of characters

a) Variable length up to a defined maximum number of characters

This notation expresses a variable length up to a defined maximum number of characters by writing after the character type and with no intermediate space, the variable length notation followed by the maximum number of characters

EXAMPLES :

a..6 : variable length up to a maximum of 6 small letters

An..5 : variable length up to a maximum of 5 capital letters and/or figures

sa..16 : variable length up to a maximum of 16 characters (of the authorized set ISO 8859-1).

b) Variable length between a defined minimum and maximum number of characters

This notation expresses a variable length between a defined minimum and maximum number of characters by writing after the character type, the minimum number of characters and the variable length notation followed by the maximum number of characters

[1] Additional notation might be added



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EXAMPLES :

a3..6 : variable length from 3 to 6 small letters

an6..9 : variable length from 6 to 9 small letters and/or figures

### 4.2.3 Length expressed by a number of lines of characters

A data element representation occasionally requires several lines of characters. These lines can be of fixed or variable length up to a defined maximum number.

This notation for expressing a number of lines is this number preceded by the letter "x", after the indication of the length of the line established as indicated in 4.2.1 and 4.2.2.

EXAMPLES :

an..35 x 4 : 4 lines having a maximum of 35 small letters and/or figures

sb 25 x 5 : 5 lines each having 25 characters (of the authorized set ISO 8859-2:1987, *Information processing - 8 bit single byte ruded graphic character sets - Part 2 : Latin alphabet No.2*).

## 5 Additional notation for figures

The rules which are specified in the preceding clauses also apply to figures.

Nevertheless, it may be desirable to distinguish numeric values by means of a specific notation

### 5.1 Numeration system

It may be necessary to indicate which numeration system is used to represent a data element. This will be done by using one of the following notation which is shown in the table below. It only includes the main numeration systems commonly in use[2].

| Notation | Numeration system | |
|---|---|---|
| | Numeration | Basis |
| B | Binary | 2 |
| O | Octal | 8 |
| D | Decimal | 10 |
| H | Hexadecimal | 16 |
| S | Sexagesimal | 60 |

This letter will be placed after the one representing the character type and before the indication of the length.

When nothing is mentioned, the numeration system is supposed to be decimal (basis 10).

[2]Additional notation might be added



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## 5.2 Notation for non computable format specification

### 5.2.1 Numbers

The numerical notation is specified by indication of the small letter "n" followed, with no intermediate space or character, by the maximum number of digits that can be present in this number.

EXAMPLE :

n3: numbers from 000 to 999

### 5.2.2 Positive and negative numbers

a) explicit notation: use of the plus "+" or minus "-" sign placed before the small letter "n"

EXAMPLES :

+n2 : positive numbers from 00 to 99

-n3 : negative numbers from -999 to 000.

b) implicit notation can be used for the positive sign

EXAMPLE :

n4 : positive numbers from 0000 to 9999.

c) the small letter "n" can be replaced by the capital letter "N" to indicate that a given number may have a negative value.

EXAMPLE :

N..2 positive or negative numbers from -99 to +99, including 0.

## 5.3 Notation for computable format specification

### 5.3.1 Types of computable formats

The human oriented expressions in ISO 6093 and IEC 1360-1 are similar to the formal format notations to be used in specifications as specified in this International Standard :

I : integer formats (I conforms to "NR1) ;

D : decimals formats (D conforms to "NR2") ;

F : floating comma (F conforms to "NR3).

A letter S indicates that the value may be negative.



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### 5.3.2 Integer formats

An integer indicates the maximum length in number of digits.

EXAMPLES :

I6 : an integer computable format of maximum 6 digits.

IS6 : an integer computable format of maximum 6 digits which may have negative values

### 5.3.3 Decimal formats

A decimal number is composed of an integer part and a decimal part.

- an integer indicates the maximum length in number of digits ;

- following a full stop, a further integer indicates the maximum number of decimal positions.

EXAMPLES :

D12.3 a decimal computable format of maximum twelve digits of which maximum three may be to the right of the decimal mark.

### 5.3.4 Floating comma format

Numbers with a floating comma are expressed according to the convention for the representation of values with exponents (ISO 6093).

- an integer indicates the maximum length in number of digits ;

- following a full stop, a further integer indicates the maximum number of decimal positions ;

- following a letter E, a letter S indicates the exponent may be negative ;

- a further integer indicates the maximum length of the exponent.

NOTE – It is recognized that the "floating comma" format referred to in this International Standard is called "floating point" in some countries. The term "floating comma" is used in this International Standard to conform to ISO 31.



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EXAMPLES :

F6.3E2 a floating comma computable format with a significand of maximum six digits of which maximum three may be to the right of the decimal mark and with an exponent of maximum two digits.

F4.3ES3 a floating comma computable format with a significand of maximum four digits of which maximum three may be to the right of the decimal mark and with an exponent of maximum three digits which may be negative.

FS4.3ES1 a floating comma computable format with a significand, which may be negative, of maximum four digits of which maximum three may be to the right of the decimal mark and with an exponent of maximum one digit which may be negative.



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