

Specification for

Check character systems for use in information interchange, and guidance on choice and methods of application

[ISO title: Data processing — Check character systems]

UDC 681.3.071.7

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This British Standard, having been prepared under the direction of the Office and Information Standards Committee, was published under the authority of the Board of BSI and comes into effect on 28 February 1985

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The following BSI references relate to the work on this standard:
Committee reference OIS/14
Draft for comment 81/64618 DC

ISBN 0 580 14031 8

Amendments issued since publication

Amd. No.	Date of issue	Comments

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National foreword

This British Standard has been prepared under the direction of the Office and Information Standards Committee. It is identical with ISO 7064:1983 “*Data processing — Check character systems*”, published by the International Organization for Standardization (ISO).

Section 1 gives definitions, types of systems and compliance and designation information, in general terms. Section 2 gives specifications for pure systems and computational methods for pure systems with one or two check characters. Section 3 gives specifications for hybrid systems and the computational method for hybrid systems.

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “British Standard”.

Cross references. There are no corresponding British Standards for the International Standards referred to in clause 0 for information only.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

The need for standardization of check character systems was determined by the following considerations:

- a) of the 100 or more systems in use, many have very similar characteristics, and much of the variety does not provide any significant benefit;
- b) few of the existing systems have been thoroughly verified mathematically and several have serious defects;
- c) the variety of systems undermines the economics of products which generate or validate check characters, and frequently prevents the checking of interchanged data.

Therefore a small set of compatible systems has been selected to cope with various application needs; they have been validated, and within the constraints of each application, offer high protection against typical transcription and keying errors.

Existing check character systems as specified in ISO 2108, ISO 2984 and ISO 6166 are used in special application fields. These do not however, achieve the error detection rate of the systems specified in this International Standard.

Annex A summarizes the criteria to be considered when selecting a check character system specified in this International Standard for a particular application.

Annex B illustrates how further compatible national check character systems may be developed for national alphabets having a different number of letters from the 26-letter internationally used alphabet for which the check character systems in this International Standard are designed.

1 Scope and field of application

1.1 This International Standard specifies a set of check character systems capable of protecting strings against errors which occur when people copy or key data. The strings may be of fixed or variable length and may have character sets which are

- a) numeric (10 digits: 0 to 9);
- b) alphabetic (26 letters: A to Z);
- c) alphanumeric (letters and digits).

Embedded spaces and special characters are ignored.

1.2 This International Standard specifies conformance requirements for products described as generating check characters or checking strings using the systems given in this International Standard.

1.3 These check character systems can detect:

- a) all single substitution errors (the substitution of a single character for another, for example 4234 for 1234);
- b) all or nearly all single transposition errors (the transposition of two single characters, either adjacent or with one character between them, for example 12354 or 12543 for 12345);
- c) all or nearly all shift errors (shift of the whole string to the left or right, for example

	1	2	3
--	---	---	---

 for

	1	2	3	
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);

- d) a high proportion of double substitution errors (two separate single substitution errors in the same string, for example 7234587 for 1234567);
- e) a high proportion of all other errors.

1.4 This International Standard excludes systems designed specifically to:

- a) permit both error detection and automatic correction;
- b) detect deliberate falsification;
- c) check strings interchanged solely between machines.

1.5 This International Standard is for use in information interchange between organizations; it is also strongly recommended as good practice for internal information systems.

Section 1. General

2 Definitions

2.1

check character

added character which may be used to verify the accuracy of the string through a mathematical relationship to that string

2.2

check character system

set of rules for generating check characters and checking strings incorporating check characters

2.3

supplementary character; supplementary check character

check character which does not belong to the character set of the strings which are to be protected

2.4

modulus

integer used as a divisor of an integer dividend in order to obtain an integer remainder

2.5

congruence

property of a set of integers which differ from each other by a multiple of the modulus. Congruence is indicated by the symbol $\equiv$. For example, $39 \equiv 6 \pmod{11}$ indicates that 39 and 6 are congruent with respect to the modulus 11, i.e. $39 - 6 = 33$, which is a multiple of 11

2.6

radix

base of a geometric progression

3 Types of systems

This International Standard specifies two types of systems:

- a) pure systems;
- b) hybrid systems.

3.1 Pure systems

The pure systems are listed in Table 1 and specified in section 2. They each use a single modulus for all stages of the calculation.

3.2 Hybrid systems

The hybrid systems are listed in Table 2 and specified in section 3. The hybrid systems each use two moduli in the calculation. One modulus is equal to, and the other is one greater than, the number of characters in the character set of the string to be protected. These hybrid systems always provide a check character within the character set of the string to be protected.

Table 1 — Pure systems

Check character system designation ^a	Application	Number and type of check characters ^b
ISO 7064, MOD 11-2	Numeric strings	1 digit or the supplementary character X
ISO 7064, MOD 37-2	Alphanumeric strings	1 digit or letter or the supplementary character ☆
ISO 7064, MOD 97-10	Numeric strings	2 digits
ISO 7064, MOD 661-26	Alphabetic strings	2 letters
ISO 7064, MOD 1271-36	Alphanumeric strings	2 digits or letters

^a The first number following “MOD” in the designation is the modulus and the second number is the radix.

^b The first two systems may produce a supplementary check character outside the character set of the string to be checked (i.e. ISO 7064, MOD 11-2 check characters are 0 to 9 plus X, and ISO 7064, MOD 37-2 check characters are 0 to 9, and A to Z, plus ☆). Where the supplementary check character is not acceptable and a single check character is required, it may be possible to avoid issuing those strings which yield the supplementary character. If neither the supplementary check character can be tolerated nor can the strings yielding it be avoided, then the hybrid systems may be used instead.