INTERNATIONAL STANDARDIZED PROFILE

ISO/IEC ISP 12070-1

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Information technology — International Standardized Profiles FCSnnn — Character set 8-bit code structure based on ISO/IEC 2022 —

Part 1:
FCS111 — 2022 Option 1

Technologies de l'information — Profils normalisés internationaux FCSnnn — Structure de code à 8 éléments de jeu de caractères basée sur l'ISO/CEI 2022 —

Partie 1: FCS111 — 2022 Option 1



Reference number
ISO/IEC ISP 12070-1:1996(E)

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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 this work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. In addition to developing International Standards, ISO/IEC JTC 1 has created a Special Group on Functional Standardization for the elaboration of International Standardized Profiles.

An International Standardized Profile is an internationally agreed, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or set of functions.

Draft International Standardized Profiles are circulated to national bodies for voting. Publication as an International Standardized Profile requires approval by at least 75% of the national bodies casting a vote.

International Standardized Profile ISO/IEC ISP 12070-1 was prepared with the collaboration of

— Asia-Oceana Workshop (AOW);

— European Workshop for Open Systems (EWOS);

— Open Systems Environment Implementors' Workshop (OIW)

ISO/IEC ISP 12070 consists of the following parts, under the general title Information technology - *International Standardized Profiles FCSnnn - Character set 8-bit code structure based on ISO/IEC 2022*:

— *Part 1: FCS111 - 2022 Option 1*

Other parts will follow.

Annex A is forms an integral part of this part of this part of ISO/IEC ISP 12070. Annexes B and C are for information only.

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Introduction

ISO/IEC ISP 12070 is defined within the context of Functional Standardization, in accordance with the principles specified in ISO/IEC TR 10000, "Framework and Taxonomy of International Standardized Profiles". The context of Functional Standardization is one part of the overall field of Information Technology (IT) standardization activities, covering base standards, profiles and registration mechanisms.

ISO/IEC 2022 itself identifies and categorises a number of specific code structures. The wide field of application of character set standards, the complexity of ISO/IEC 2022 and the low level of awareness of character set issues within the functional standard development groups has given rise to lack of precision and ambiguity in specifying the use of coded character sets within the functional standards. This in turn has given rise to interoperability problems for implementors and users of products which claim conformance to those functional standards. It should be noted that a similar lack of awareness has also arisen in the base standard development groups with similar consequences and a resulting effect on the groups which are attempting to profile the base standards.

This part of ISO/IEC ISP 12070 has been studied by the three Regional OSI Workshops, namely the OSI Implementors' Workshop (OIW) of the United States, the European Workshop for Open Systems (EWOS) and the OSI Asia-Oceania Workshop (AOW). The constitutions of the three workshops ensure that the development process was open to all interested parties. However, AOW and OIW indicated through the RWS-CC that they had no interest in the development of this ISP part. It was developed under the editorship of EWOS. The text has therefore only been ratified by the plenary assembly of EWOS.

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Information technology — International Standardized Profiles FCSnnn — Character set 8-bit code structure based on ISO/IEC 2022 —

Part 1:
FCS111 — 2022 Option 1

1 Scope

Within the set of character set standards there are two generic code structures, that defined by ISO/IEC 2022 for 7 and 8 bit transport mechanisms and that defined by the new ISO 10646 for a multi-octet transport mechanism. This part of ISO/IEC ISP 12070 is concerned with the ISO/IEC 2022 code structure.

This part of ISO/IEC ISP 12070 is applicable in the following cases:

a) the use of ASN.1 type GeneralString
b) the use of ASN.1 type GraphicString
c) the use of ASN.1 type TeletexString
d) the use of non-ASN.1 character strings (e.g. when a character string is embedded in the ASN.1 OCTET STRING as in ODA)

In many instances the requirements of this part of ISO/IEC ISP 12070 apply to all of these cases but where there are specific requirements applying to particular cases, these are highlighted separately.

This part of ISO/IEC ISP 12070 lays down requirements so that a consistent approach may be taken when specifying the use of coded character sets in functional standards.

Some specifications relate to "pass-through" services (e.g. MHS and Directory). Such services are outside the scope of this part of ISO/IEC ISP 12070.

Requirements for the use of character sets in Telematic services (eg Teletex and Videotex) are outside the scope of this part of ISO/IEC ISP 12070.

The requirements specified in part of ISO/IEC ISP 12070 specifically apply to Western Europe but may be applicable in other regions of the world.

2 Conformance and compliance

Four categories of conformance are specified in this part of ISO/IEC ISP 12070.

1) Conformance to the requirements for ASN.1 type GraphicString,

A claim for conformance shall support all the requirements evaluating to mandatory that are listed in tables A.2 and A.3.

2) Conformance to the requirements for ASN.1 type *GeneralString*,

A claim for conformance shall support all the requirements evaluating to mandatory that are listed in tables A.4 and A.5.

3) Conformance to the requirements for ASN.1 type *TeletexString*,

A claim for conformance shall support all the requirements evaluating to mandatory that are listed in tables A.6 and A.7.

4) Conformance to the requirements for non-ASN.1 string types.

A claim for conformance shall support all the requirements evaluating to mandatory that are listed in tables A.8 and A.9.

A compliant referencing specification shall indicate which categories of conformance are required to be supported. A compliant referencing specification may need to include a Profile Requirements List (PRL) which refers to the tables in Annex A when that specification makes selections of options available. A compliant referencing specification shall require implementors of that specification to complete the ICS proforma in Annex A of this part of ISO/IEC ISP 12070.

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Some base standards may have requirements on the handling of character sets which differ from those recommended in this part of ISO/IEC ISP 12070 (e.g. ODA). Where a requirement differs in this way, the base standard specification takes precedence over this part of ISO/IEC ISP 12070.

3 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 12070. At the time of publication, the editions indicated are valid. All documents are subject to revision, and parties to agreements based on this part of ISO/IEC 12070 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and ITU-T maintains published editions of its current recommendations.

NOTE — Edition 2 and edition 3 of both ISO/IEC 8824 and ISO/IEC 8825 will continue to be published together. Current editions of OSI protocol specifications reference these second editions which make specific reference to character set standards. This part of ISO/IEC ISP 12070 is based upon the second editions. The latest editions of the character set standards are listed in 3.2 where such reference does not cause inconsistency with the second editions of ISO/IEC 8824 and ISO/IEC 8825. Otherwise previous editions are listed.

3.1 Paired CCITT Recommendations | International Standards equivalent in technical content

— CCITT Recommendation X.208 : 1988, *Specification of abstract syntax notation one (ASN.1)*

ISO/IEC 8824 : 1990, *Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).*

— CCITT Recommendation X.209 : 1988, *Specification of basic encoding rules for abstract syntax notation one (ASN.1)*

ISO/IEC 8825 : 1990, *Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*

3.2 Additional references

— ISO/IEC 646 : 1991, *Information technology - ISO 7-bit coded character set for information interchange.*

— ISO/IEC 2022 : 1994, *Information technology - Character code structure and extension techniques.*

— ISO 2375 : 1985, *Data processing - Procedure for registration of escape sequences.*

— ISO/IEC 4873 : 1991, *Information technology - ISO 8-bit code for information interchange - Structure and rules for implementation.*

— ISO/IEC 6429 : 1992, *Information technology - Control functions for coded character sets.*

— ISO/IEC 6937 : 1994 *Information technology - Coded graphic character set for text communication - Latin alphabet.*

— CCITT Recommendation T.61 (1988), *Character repertoire and coded character sets for the International Teletex service.*

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

4 Definitions

4.1 ISO/IEC 2022 definitions

This part of ISO/IEC ISP 12070 uses the following definitions contained in ISO/IEC 2022.

a) byte
b) character
c) coded character set; code
d) code table
e) control character
f) control function
g) to designate
h) escape sequence
i) final byte
j) graphic character
k) to invoke
l) repertoire

4.2 Basic terms

For the purposes of this part of ISO/IEC ISP 12070, the following term applies.

4.2.1 Instance of Communication: That part of a data stream that may be considered to be a single unit within which the scope of a requirement of this part of ISO/IEC ISP 12070 applies.

A single instance of the ASN.1 type *GraphicString* when coded in a data stream is considered to be an *instance of communication.*

A single instance of the ASN.1 type *GeneralString* when coded in a data stream is considered to be an *instance of communication.*

A single instance of the ASN.1 type *TeletexString* when coded in a data stream is considered to be an *instance of communication.*

These are defaults. Functional Standards which reference any of the ASN.1 types *GraphicString*, *GeneralString* and *TeletexString* and wish to change the meaning of "instance of communication" should specify, in each case of use, its precise meaning.

[1] To be published. (revision of ISO 8859-1:1987)

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A single instance of a non-ASN.1 string type when coded in a data stream may be considered to be an *instance of communication* and this is the default. Functional Standards which reference a non-ASN.1 string type should specify, in each case of use, the precise meaning of *instance of communication*.

5 Abbreviations

ASN.1 Abstract Syntax Notation One
ICS Implementation Conformance Statement
ODA Open Document Architecture
OSE Open Systems Environment
IRnn International Register entry nn
IRV International Reference Version
MHS Message Handling Service

6 Errors

Many requirements identified in the remainder of this part of ISO/IEC ISP 12070 prohibit sending implementations from sending certain sequences of coded characters and allow receiving implementations to treat the receipt of such a sequence of coded characters as an error. A sending implementation which sends an illegal sequence of coded characters does not conform to this part of ISO/IEC ISP 12070 but in general it is not possible to test this aspect of conformance. The precise action that a receiving implementation takes when an illegal sequence of coded characters is received is outside the scope of this part of ISO/IEC ISP 12070. A referencing specification shall specify the action that a receiving implementation takes when such an error is detected.

7 The ISO/IEC 2022 code structure

The major division within ISO/IEC 2022 is between the 7-bit and the 8-bit code structure. The 7-bit code structure is the older of the two and dates back to the early days of computing and data communications. The greater capacity of 8-bit transport mechanisms, the ability of modern communications technology to handle them and the widespread use of ASN.1 to specify OSI communications protocols leads naturally to the first requirement to be capable of operating in the 8-bit ISO/IEC 2022 code structure.

Requirement 1:

a) A sending implementation shall be capable of operating in the ISO/IEC 2022 8-bit code structure.

b) A receiving implementation shall be capable of operating in the ISO/IEC 2022 8-bit code structure.

8 The ISO 4873 code structure

ISO/IEC 2022 defines a wide range of sub-structures for the use of 8-bit codes which could be considered to be profiles. ISO/IEC 4873 chooses a nested set of 3 sub-structures (levels) and specifies how these should be used. ISO/IEC 4873 profiles appear to cater for the majority of functional standard requirements. However, ISO/IEC 4873 does not cater for all scenarios where character sets are in use. Therefore, the requirements specified in this part of ISO/IEC ISP 12070 are based on ISO/IEC 4873 wherever possible and where this is not the case, extra requirements are specifically highlighted.

9 The use of announcer escape sequences

ISO/IEC 4873 specifies the use of announcer escape sequences to announce the use of a specific level of operation. In an open ISO/IEC 2022 code structure, announcer escape sequences should always be used at the beginning of an instance of communication (i.e. coded character string) to announce the code structure facilities that are proposed. This is the ISO/IEC 2022 method of negotiation. However, few, if any, referencing base standards actually specify the use of announcer control functions and ISO/IEC 8825 specifically forbids their use for its character string data types (e.g. GeneralString) unless the referencing base standard specifically removes this restriction. None of the OSI, messaging or text processing (ODA) base standards ratified to date actually do this.

Where announcer sequences are not supported, it is still necessary for two communicating parties to come to a mutual understanding of the code structure facilities to be used in an instance of communication. This may be done outside the scope of a coded character exchange by:

1) bilateral private a priori arrangements;
2) unilateral decision (e.g. in a base or functional standard);
3) in a procurement specification (e.g. EPHOS);
4) by a separate protocol exchange (e.g. using OCTET STRING);
5) by some system management action.

ISO/IEC 4873 defines 3 levels of operation. In the absence of announcement or other decision, the default level for a receiving or a sending implementation is the highest level that is supported by that implementation.

9.1 Non-ASN.1 character string types

Support for announcer sequences is optional for both receiving and sending implementations.

Requirement 2:

a) A sending implementation which claims support of announcer sequences shall send an announcer escape sequence at the beginning of an instance of communication to announce the level of ISO/IEC 4873 being proposed in that direction of data flow and shall support the semantics of that announcer sequence.

b) A receiving implementation which claims support of announcer sequences shall be capable of receiving an announcer escape sequence to announce the level of ISO/IEC 4873 being proposed in that direction of data

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flow and shall support the semantics of that announcer sequence.

Requirement 3:

a) A sending implementation which does not claim support of announcer sequences shall not send any announcer sequences.

b) A receiving implementation that does not support announcer sequences shall be capable of receiving an announcer sequence without malfunction, but shall ignore it (i.e. take no action as a result).

For completeness the announcer escape sequence is of the form ESC 02/00 F where F takes the following values:

ISO/IEC 4873 level 1 04/12
ISO/IEC 4873 level 2 04/13
ISO/IEC 4873 level 3 04/14

The action taken as the result of receiving or sending of any other announcer escape sequence is outside the scope of this part of ISO/IEC ISP 12070.

9.2 ASN.1 character string types

Requirement 4:

a) A sending implementation shall not send announcer sequences.

b) A receiving implementation may treat as an error the reception of an announcer sequence.

10 The use of designation escape sequences

A designation escape sequence is used to designate a G-set to a registered coded character set as specified in ISO/IEC 2022.

10.1 Position of designation escape sequence

ISO/IEC 4873 specifies that one or more designation escape sequences shall occur at the beginning of an instance of communication (i.e. coded character string) as part of the announcement of the version of ISO/IEC 4873 to be used in that direction of data flow.

10.1.1 Non-ASN.1 character string types

Requirement 5:

a) A sending implementation that supports announcer sequences shall identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences immediately after the announcer escape sequence at the beginning of an instance of communication.

b) A receiving implementation that supports announcer sequences shall support the semantics of a ISO/IEC 4873 version designation subject to its support of ISO/IEC 4873 levels.

If redesignation of a G-set is required in the middle of an instance of communication, then an announcer escape sequence shall precede it.

NOTE — ISO/IEC 2022 identifies levels of operation similar to the 3 levels of ISO/IEC 4873. The first three levels of ISO/IEC 2022 align with ISO/IEC 4873. The 4th level allows redesignation and but does not have an equivalent in ISO/IEC 4873.

This part of ISO/IEC ISP 12070 deprecates redesignation as specified in ISO/IEC 4873. However, the following requirement is included for completeness.

Requirement 6:

a) If a sending implementation that supports announcer sequences wishes to redesignate a G-set during an instance of communication, it shall send an announcer sequence and a set of designation escape sequences.

b) A receiving implementation that supports announcer sequences shall support redesignation.

c) A receiving implementation which supports announcer sequences may treat as an error the receipt of an escape sequence redesignating a G-set which is not preceded by an announcer sequence.

An implementation that does not support the sending of announcer sequences may nevertheless identify a version of ISO/IEC 4873 to be used by assuming the level (communicated by other means or by default) and using designation escape sequences. However, in this case, redesignation is prohibited by this part of ISO/IEC ISP 12070.

Requirement 7:

a) A sending implementation that does not support announcer sequences may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences at the beginning of an instance of communication.

b) A receiving implementation that does not support announcer sequences shall support designation escape sequences subject to its support of ISO/IEC 4873 levels.

Requirement 8:

a) A sending implementation that does not support announcer sequences shall not attempt to redesignate during an instance of communication.

b) A receiving implementation that does not support announcer sequences may treat as an error the reception of a redesignation escape sequence.

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A designation escape sequence may be omitted if the default designation for that G-set is to apply.

10.1.2 ASN.1 character string types

Requirement 9:

a) A sending implementation may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences at the beginning of an instance of communication.

b) A receiving implementation shall support designation escape sequences subject to its support of ISO/IEC 4873 levels.

Designation sequences for default settings may be omitted from the version announcement. A sender may later in the string override a default designation but this practice is deprecated by this part of ISO/IEC ISP 12070.

Requirement 10:

a) A sending implementation shall not attempt to redesignate during an instance of communication.

b) A receiving implementation may treat as an error the reception of a redesignation escape sequence.

A designation escape sequence may be omitted if the default designation for that G-set is to apply.

10.2 G0 designation

ISO/IEC 4873 prescribes the use of international register (IR) No 6 (ASCII) coded character set permanently as the G0 set in its code structure.

Requirement 11:

a) A sending implementation shall not send a designation escape sequence which designates a coded character set other than IR 6 as G0.

b) A receiving implementation may treat as an error the reception of a designation escape sequence which designates a coded character set other than IR 6 as G0.

10.2.1 Non-ASN.1 character string types

The default G0 set is IR 6.

Requirement 12:

a) The requirement for a sending implementation to be capable of sending a designation escape sequence for G0 for IR 6 is optional.

b) A receiving implementation shall be capable of receiving a designation escape sequence for G0 for IR 6.

10.2.2 ASN.1 character string types

For ASN.1 types *GraphicString* and *GeneralString* the default G0 set is IR 2.

Requirement 13:

For ASN.1 types *GraphicString* and *GeneralString*:

a) A sending implementation shall send as part of its ISO/IEC 4873 version designation (see requirement 9) a designation escape sequence to designate G0 as IR 6.

b) A receiving implementation may treat as an error the reception of a coded character in G0 before the reception of a designation escape sequence for G0 for IR 6.

10.3 ISO/IEC 4873 level 1 requirements

Level 1 of ISO/IEC 4873 supports the use of G0, G1, C0 and C1.

Requirement 14:

a) A sending implementation shall support at least the operation of ISO/IEC 4873 level 1.

b) A receiving implementation shall support at least the operation of ISO/IEC 4873 level 1.

Requirement 15:

A sending implementation which needs to support only 2 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 Level 1.

Requirement 16:

a) A sending implementation that operates at ISO/IEC 4873 level 1 (by announcement, by other decision or by default) shall not send designation escape sequences for G2 or G3.

b) A receiving implementation that operates at ISO/IEC 4873 level 1 (by announcement, by other decision or by default) may treat as an error the reception of designation escape sequences for G2 or G3.

Requirement 17:

a) A sending implementation shall support, for each registered character set it claims to support in GR over and above the default G-set, the sending of the designation escape sequence for G1.

b) A sending implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support over and above the default C-sets, the sending of designation escape sequences for C0 and

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C1 respectively.

c) A receiving implementation shall support, for each registered coded character set it claims to support in GR, the reception of the designation escape sequence for G1.

d) A receiving implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support, the reception of designation escape sequences for C0 and C1 respectively.

ISO/IEC 4873 states that at level 1, either or both G1 and C1 may be empty. The following requirement therefore applies.

Requirement 18:

a) A sending implementation that operates at ISO/IEC 4873 level 1 may optionally support the sending of designation escape sequences specifying an empty G1 or an empty C1.

b) A receiving implementation that operates at ISO/IEC 4873 level 1 shall support the reception of designation escape sequences specifying both an empty G1 and an empty C1.

10.4 ISO/IEC 4873 level 2 and 3 requirements

Levels 2 and 3 of ISO/IEC 4873 support the use of G0, G1, G2, G3, C0 and C1.

Requirement 19:

a) A sending implementation which needs to support 3 or 4 coded character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 2 or level 3.

b) A receiving implementation which needs to support 3 or 4 coded character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 3.

NOTE — The requirement for receivers is made for reasons of interoperability.

Requirement 20:

a) A sending implementation shall support, for each registered character set it claims to support in GR over and above the default G-sets, the sending of designation escape sequences for at least one of G1, G2 and G3.

b) A sending implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support over and above the default C-sets, the sending of designation escape sequences for C0 and C1 respectively.

c) A receiving implementation shall support, for each registered coded character set it claims to support in GR, the reception of designation escape sequences for G1, G2, and G3.

d) A receiving implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support, the reception of designation escape sequences for C0 and C1 respectively.

At Level 3, either but not both G2 and G3 may be empty. If designation sequences are sent that result in both G2 and G3 being empty, subsequent operations are carried out at level 1. This is permitted.

Requirement 21:

a) A sending implementation may optionally support the sending of designation escape sequences for the empty G2 or G3 sets.

b) A receiving implementation shall support the reception of the designation escape sequences for the empty G2 and G3 sets.

10.5 The form of designation escape sequences

For completeness, the form of the designation sequences is laid out below:

G0 ESC 02/08 04/02 designates IR6

G1 ESC 02/09 F designates a 94 coded character set
ESC 02/13 F designates a 96 coded character set
ESC 02/09 07/14 designates an empty G1 set

G2 ESC 02/10 F designates a 94 coded character set
ESC 02/14 F designates a 96 coded character set
ESC 02/10 07/14 designates an empty G2 set

G3 ESC 02/11 F designates a 94 coded character set
ESC 02/15 F designates a 96 coded character set
ESC 02/11 07/14 designates an empty G3 set

C0 ESC 02/01 F designates a C0 set of control functions

C1 ESC 02/02 F designates a C1 set of control functions
ESC 02/02 07/14 designates an empty C1 set

The final byte F forms part of the registration of the coded character set.

10.6 Teletex related operation

The Teletex service style of operation as defined in CCITT T.61 and ISO/IEC 6937 uses a variable length coding to code characters which have diacritical marks. The use of this style of operation is deprecated by this part of ISO/IEC ISP 12070 for all character string types apart from ASN.1 type *TeletexString* (also known as *T61String*) which is specifically designed for it. This means that the designation of IR 103 (Teletex Supplementary Set of Graphic Characters for CCITT Recommendation T.61) and IR 156 (Supplementary Set of ISO/IEC 6937) as G1, G2 or G3 is prohibited for character string types other than *TeletexString*.

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NOTE—It is possible to code the Teletex repertoire by one byte 8-bit coding by using the registered character sets according to IR6, IR100, IR101 and IR154.

Requirement 22: Apart from ASN.1 type *TeletexString*:

a) A sending implementation shall not send a designation sequence specifying IR 103 or IR 156 or any other registered character set containing non-spacing diacritical marks.

b) A receiving implementation may treat as an error the reception of a designation sequence specifying IR 103 or IR 156 or any other registered character set containing non-spacing diacritical marks.

10.7 Multibyte character set requirements

The designation sequences listed above cater for the European requirement and it is believed the North American requirement. They fall within the scope and specification of ISO/IEC 4873.

NOTE — ISO/IEC 4873 does not allow the use of registered multibyte coded character sets. It therefore does not support the use of Japanese, Chinese or Korean character sets.

10.8 Minimum level of support

10.8.1 Graphic character repertoires

Requirement 23:

The minimum graphic character repertoire support required in Western Europe for the ISO/IEC 2022 8-bit code structure is the 191 characters of ISO/IEC 8859-1 which consist of the graphic character repertoire of IR 6 (94 characters) plus the graphic character repertoire of IR 100 (96 characters) plus SPACE.

NOTE — This minimum requirement is a subset of the Minimum European Subset of ISO/IEC 10646-1 currently being defined by CEN TC 304.

10.8.2 Control function repertoires

This part of ISO/IEC ISP 12070 specifies, as a default, the use of minimum control function repertoires for use with levels 1, 2 and 3 of ISO/IEC 4873.

When operating at level 1, the minimum control function repertoire consists only of ESCAPE.

When operating at level 2, the minimum control function repertoire consists of ESCAPE, SS2 and SS3.

When operating at level 3 the minimum control function repertoire consists of ESCAPE, SS2, SS3, LS1R, LS2R, LS3R. The locking shift functions are escape sequences and are listed in clause 8.

These requirements may be satisfied by the use of appropriate registered control sets. Referencing application profiles may require control function repertoires containing more control functions than the minimum required for the level of ISO/IEC 4873 in use.

Requirement 24:

For all levels, the C0 set shall be used which contains ESCAPE coded as 01/11.

Requirement 25:

For levels 2 and 3, the C0 set and the C1 set shall be used which contains SS2 coded as 08/14 and SS3 coded as 08/15.

This part of ISO/IEC ISP 12070 does not specify or reference the semantics associated with other control functions. A referencing specification that needs other control functions shall specify them and the associated semantics.

10.9 Designation Defaults

Certain default settings for G-set designations may bring implementation savings in certain instances. Also, the use of defaults removes any ambiguity if designation sequences are missing or other defaults set by referencing specifications are not in effect (e.g. for ASN.1 type GeneralString). Where other defaults apply, they take precedence over the defaults listed below.

The use of an announcer sequence shall cause the reset of any designation status to default values.

Requirement 26:

a) A implementation which sends an announcer sequence shall reset all of its designation settings to default values.

b) A receiving implementation which supports announcer sequences shall reset all its designation settings to default values when it receives an announcer sequence.

Requirement 27:

An implementation shall set its default designation settings to default values at the beginning of an occurrence of an ASN.1 character string type.

Requirement 28:

The following designation defaults apply to ASN.1 types *GraphicString, GeneralString* and to non-ASN.1 string types.

G0 IR 6	ASCII (left hand part of ISO/IEC 8859-1)
G1 IR 100	Right hand part of ISO/IEC 8859-1
G2	The empty G2 set (ISO/IEC 4873 level 2 or 3 only)
G3	The empty G3 set (ISO/IEC 4873 level 2 or 3 only)

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C0 IR 1 C0 set of ISO 646 (the IRV)

C1 IR 105 Minimum C1 set for ISO/IEC 4873 (ISO/IEC 4873 level 2 or 3 only)

A C0 set consisting of ESCAPE only has registration no. 104. However, choice of this default is felt to be too restrictive. The default C0 set is therefore chosen as the IR 1 - the C0 control set of ISO 646. (It should be noted that IR 1 is referred to in ISO/IEC 646 as the C0 set of ISO 6429).

A C1 set consisting of SS2 and SS3 is defined in IR 105 and this is chosen as the default.

11 Invocation control functions

11.1 General requirements

The following locking shift invocation control functions are defined in ISO/IEC 2022 and are used in a ISO/IEC 4873 code structure at level 3:

LS1R ESC 07/14 (IR 66) to invoke G1 in the GR of the code space
LS2R ESC 07/13 (IR 65) to invoke G2 in the GR of the code space
LS3R ESC 07/12 (IR 64) to invoke G3 in the GR of the code space

No other locking shift functions are allowed.

Requirement 29:

a) A sending implementation shall not send locking shift functions other than LS1R, LS2R and LS3R.

b) A receiving implementation may treat as an error the reception of locking shift functions other than LS1R, LS2R and LS3R.

At ISO/IEC 4873 level 3, a locking shift invocation control function may occur at any point and as often as required during an instance of communication. In an instance of communication, the invocation caused by the use of a locking shift function remains in effect until another locking shift function occurs.

The following single shift invocation control functions are defined in ISO/IEC 2022 and are used in a ISO/IEC 4873 code structure at levels 2 and 3:

SS2 08/14
SS3 08/15

The use of the alternative ISO/IEC 2022 ESC Fe sequences for coding SS2 and SS3 is not permitted and may be treated by a receiving implementation as an error.

Requirement 30:

a) A sending implementation shall not send any control function which is coded in an ESC Fe sequence.

b) A receiving implementation may treat as an error the reception of any control function which is coded in an ESC Fe sequence.

A single shift invocation control function may occur at any time and as often as required during an instance of communication. Each invocation is of a single character (that following the single shift function) into the GL of the code space. This part of ISO/IEC ISP 12070 takes the view that the invocation of an empty code table position is not allowed. An empty G-set is one that consists entirely of empty code table positions.

The use of single shift or locking shift functions shall only be used when levels for which they are defined are in use.

Requirement 31:

a) A sending implementation that operates at ISO/IEC 4873 level 1 (by announcement, by other decision or by default) shall not send any single shift nor any locking shift function.

b) A receiving implementation that operates at ISO/IEC 4873 level 1 (by announcement, by other decision or by default) may treat as an error the reception of any single shift or any locking shift function.

Requirement 32:

A sending implementation that operates at ISO/IEC 4873 level 2 (by announcement, by other decision or by default) shall not send any locking shift function.

A sending implementation need only support the minimum set of functions of ISO/IEC 4873 required to use 3 or 4 coded graphic character sets concurrently. A receiving implementation which needs to support 3 or 4 coded graphic character sets concurrently shall support the full operation of ISO/IEC 4873 level 3.

Requirement 33:

a) A sending implementation which claims to support the use of 3 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2, LS2R, SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.

b) A sending implementation which needs to support the use of 4 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2 and LS2R and at least one of SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.

c) A receiving implementation which needs to support the use of 3 or 4 coded graphic character sets concurrently shall support the reception and semantics of SS2, SS3, LS1R, LS2R and LS3R as defined in ISO/IEC 4873 level

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2 and level 3

Requirement 34:

a) A sending implementation that operates at ISO/IEC 4873 level 2 or level 3 shall not send any single shift control function which attempts to invoke an empty cell of a code table into GL.

b) A receiving implementation that operates at ISO/IEC 4873 level 3 may treat as an error the reception of any single shift control function which attempts to invoke an empty cell of a code table into GL.

G0 is permanently invoked into GL. This applies whatever registered coded character set is designated as G0. G0 is never designated as the empty set - it has a default designation or is designated as IR 6. This implies that LS0 is never used - see requirement 29.

Requirement 35:

G0 is permanently invoked into GL.

C0 and C1 are permanently invoked into CL and CR respectively. This applies whatever registered control sets are designated as C0 and C1 respectively.

Requirement 36:

C0 and C1 are permanently invoked into CL and CR respectively.

By default G1 is initially invoked into GR and the use of a G1 designation function automatically invokes G1 into GR irrespective of the current shift status.

Requirement 37:

By default, G1 is initially invoked into GR.

Requirement 38:

The use of a G1 designation escape sequence invokes G1 into GR.

12 Character coding

Requirement 39:

The character coding that shall be used is defined in the code tables registered in the ISO International Register of Coded Character Sets to be Used with Escape Sequences.

Where a particular implementation requires that every character should have a unique coded representation, then requirement 40 applies.

Requirement 40:

a) A sending implementation shall not send any coded character that has not been taken from the lowest numbered G-set in which that character has been allocated.

b) A receiving implementation may treat as an error any coded character that has not been taken from the lowest numbered G-set in which that character has been allocated.

Requirement 41:

a) A sending implementation shall not send any byte that represents an empty code table position.

b) A receiving implementation may treat as an error the reception of any byte that represents an empty code table position.

13 The Characters SPACE and DEL

ISO/IEC 4873 makes available and always codes SPACE as 02/00 and DEL as 07/15. SPACE is included in ISO/IEC 8859-1 but DEL is not. This is a basic discrepancy.

DEL was originally used to erase or obliterate an erroneous or unwanted character in punched tape. DEL may be used for media-fill or time-fill. DEL characters may be inserted into, or removed from, a data stream without affecting the information content of that stream, but such action may affect the information layout and/or control of equipment.

The use of DEL is considered obsolete in modern data communications in the context of the user data part of application layer protocols. There is no requirement for its use in application profiles and its use is therefore considered outside of scope by this part of ISO/IEC ISP 12070.

Requirement 42:

a) A sending implementation shall not use code 07/15 to represent the character DEL in user data.

b) A receiving implementation may treat as an error the reception of the character DEL (coded as 07/15) in user data.

14 ASN.1 type GeneralString

The provisions of clauses 3 to 9 apply to this string type apart from those relating specifically to non-ASN.1 string types. In addition, it should be noted that the ISO/IEC 8824 default for G0 designation and invocation is IR 2 (the IRV of ISO 646 1983). Therefore, implementations shall designate G0 explicitly as IR 6 before sending any coded characters (see Requirement 13).

The ISO/IEC 8824 default for C0 is IR 1 (the C0 set of ISO 6429) and this is assumed generally by this part of ISO/IEC ISP 12070.

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ISO/IEC 8824 has no other default settings. However, this part of ISO/IEC ISP 12070 specifies defaults for the remaining sets (G1, G2, G3, C1) which may be assumed by implementations following the recommendations of this part of ISO/IEC ISP 12070.

An instance of ASN.1 Type *GeneralString* is considered to be an instance of communication. Therefore, each occurrence of this type should be treated independently. In particular, any designation of a G set or C set outside the default settings in one instance cannot be assumed to carry over into the next instance. Implementors are therefore advised to include designations for G sets and C sets outside the default settings at the beginning of every instance of this string type. Otherwise there will be a reversion to default designations and may have an undesired effect on the application.

Requirement 43:

A sending implementation shall designate the required G sets and C sets at the beginning of every instance of the ASN.1 type *GeneralString* where the requirement is different from the default designations.

15 ASN.1 type GraphicString

The provisions of clauses 3 to 9 apply to this string type apart from those relating specifically to non-ASN.1 character string types and those relating to control sets. In addition, it should be noted that the ISO/IEC 8824 default for G0 designation and invocation is IR 2 (the IRV of ISO 646 1983). Therefore, implementations shall designate G0 explicitly as IR 6 before sending any coded characters (see Requirement 13).

ISO/IEC 8824 has no other default settings. However, this part of ISO/IEC ISP 12070 specifies defaults for the remaining G sets (G1, G2, G3) which may be assumed by implementations following the recommendations of this part of ISO/IEC ISP 12070.

An instance of ASN.1 Type *GraphicString* is considered to be an instance of communication. Therefore, each occurrence of this type should be treated independently. In particular, any designation of a G set outside the default settings in one instance cannot be assumed to carry over into the next instance. Implementors are therefore advised to include designations for G sets outside the default settings at the beginning of every instance of this string type. Otherwise there will be a reversion to default designations which may have an undesired effect on the application.

Requirement 44:

A sending implementation shall designate the required G sets at the beginning of every instance of the ASN.1 type *GraphicString* where the requirement is different from the default designations.

For ASN.1 type *GraphicString*, C0 is not specified. However, the control character ESC is assumed to be available for designation sequences. In particular, it is assumed that LS1R, LS2R and LS3R are always available for invocation of G1 to G3. For ASN.1 type *GraphicString*, C1 is not specified. However, it is assumed that SS2 and SS3 are always available for invocation.

16 ASN.1 type TeletexString

16.1 General

This string type was designed for use with the CCITT T.61 and ISO/IEC 6937 styles of operation which use a variable length coding to code characters with diacritical marks. It was originally designed to reference CCITT T.61:1984 and ISO 6937:1983 and the specification has not been modified since. This means that the *TeletexString* type specification is now out of alignment. This makes requirements on the use of this type difficult to define.

The requirements specified in this clause contain modifications to some of the requirements already made above plus some extra requirements. The requirements do not relate to ITU-T telematic services such as Teletex or Videotex, but they are inteneded to relate to the use of *TeletexString* in OSI applications such as MHS and Directory in Western Europe.

Requirement 45:

The implementation of the ASN.1 type *TeletexString* shall operate only at ISO/IEC 4873 level 1.

16.2 Designation escape sequences

Requirement 9T:

a) A sending implementation may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending designation escape sequences for G0 and/or G1 at the beginning of an instance of communication.

b) A receiving implementation shall support designation escape sequences for G0 and G1.

Designation sequences for default settings may be omitted from the version announcement which may leave the version announcement empty (i.e. not present). A sender may later in the string override a default designation but this practice is deprecated by this part of ISO/IEC ISP 12070.

NOTE — *TeletexString* uses IR 102 in G0 rather than IR 6. CCITT T.51:1992 and ISO/IEC 6937:1992 have aligned the primary set with IR6. CCITT T.51:1992 refers to IR 6. ISO/IEC 8824:1993 also refers to IR6.

Requirement 11T:

a) A sending implementation may send a designation escape sequence to designate G0 as IR 102 or IR6.

b) A sending implementation shall not send a designation escape sequence which designates a coded character set other than IR 102 or IR6 as G0.

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c) A receiving implementation shall be capable of receiving a designation escape sequence for G0 for IR 102 or IR6.

d) A receiving implementation may treat as an error the reception of a designation escape sequence which designates a coded character set other than IR 102 or IR6 as G0.

TeletexString does not support empty sets in G1 nor C1.

Requirement 17T:

Requirement 17 does not apply.

Requirement 18T:

Requirement 18 does not apply.

TeletexString has its own defaults.

Requirement 28T:

The following designation defaults apply to *TeletexString*:

G0 IR 102 Teletex Primary Set of Graphic Characters CCITT Rec. T.61

G1 IR 103 Teletex Supplementary Set of Graphic Characters CCITT Rec. T.61

C0 IR 106 Teletex Primary Set of Control Functions CCITT Rec. T.61

C1 IR 107 Teletex Supplementary Set of Control Functions CCITT Rec. T.61

C0 is permanently designated as IR 106 and permanently invoked, however, only ESCAPE may be used. C1 is permanently designated as IR 107 and permanently invoked.

Requirement 46:

For *TeletexString*:

a) A sending implementation shall not send a designation escape sequence for C0.

b) A sending implementation shall not send a designation escape sequence for C1.

c) A receiving implementation may treat as an error the reception of a designation sequence for C0.

d) A receiving implementation may treat as an error the reception of a designation sequence for C1.

The list of registered coded character sets that may be designated as G1 is:

IR 103 Teletex secondary graphic character set (the default)
IR 156 Supplementary set of ISO/IEC 6937 (equivalent to IR 103)
IR 126 Greek Supplementary Set (optional)

Requirement 47:

For ASN.1 type *TeletexString*:

a) A sending implementation may send a designation escape sequence for G1 for IR 103, IR 156 or IR 126 only.

b) A receiving implementation shall be capable of receiving a designation escape sequence for G1 for IR 103

c) A receiving implementation may optionally be capable of receiving a designation escape sequence for G1 for IR 126.

d) A receiving implementation may optionally be capable of receiving a designation escape sequence for G1 for IR 156.

e) A receiving implementation may treat as an error a designation sequence for G1 for other than IRs 103, 156 or 126.

NOTE — FDI11 identifies IR 87 (Japanese Character Set (JIS C 62226 - 1983). The use of IR 87 is outside the scope of this part of ISO/IEC ISP 12070.

16.3 Character coding

Requirement 48:

For ASN.1 type *TeletexString*:

a) A sending implementation shall not send a non-spacing diacritical mark which is not immediately followed by a graphic character to form a character from the repertoire of ISO/IEC 6937.

b) A receiving implementation may treat as an error the reception of a non-spacing diacritical mark which is not immediately followed by a graphic character to form a character from the repertoire of ISO/IEC 6937.

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Annex A

(normative)

ICS proforma

A.1 Classification

In the following tables the status and support columns are split into sender (S) status and receiver (R) status.

The classification in the status column is as follows:

m: Support for the feature is mandatory.
o: Support for the feature is optional.
c: Support for the feature is conditional. The predicate expressions are contained at the end of the relevant tables.
x: Support for the feature is excluded. When applied to specific coded characters, a sender shall not send them and a receiver shall treat as an error the reception of them.
i: Support for the feature is out of scope.
-: Not applicable in this context.

When filling in the answers to this ICS in the support column, the following classification shall be used:

y: Supported
n: Not supported

A.2 Support for character string features

Table A.1 - Support for Character String Features

Ref.	Description	Status		Support	
		S	R	S	R
1	Support for ASN.1 Type GraphicString	o	o		
2	Support for ASN.1 Type GeneralString	o	o		
3	Support for ASN.1 Type TeletexString	o	o		
4	Support for non-ASN.1 character stream	o	o		

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A.3 Requirements for ASN.1 type GraphicString

Table A.2 - Primary requirements for ASN.1 type GraphicString

Ref.	Description	Status		Support	
		S	R	S	R
1	Support for ISO/IEC 4873 level 2	c1	o		
2	Support for ISO/IEC 4873 level 3	o	c2		
c1: if A.2.2.s then m else o c2: if A.2.1.r then m else i					

Table A.3 - Detailed requirements for ASN.1 type GraphicString

Ref.	Description	Status		Support	
		S	R	S	R
1	Operation in the 7-bit ISO/IEC 2022 code structure	x	x		
4a	Announcer sequences.	x	i		
4b	Receiver treats as an error?	-	o	-	
9a	A sending implementation may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences at the beginning of an instance of communication.	o	-		-
9b	A receiving implementation shall support designation escape sequences subject to its support of ISO/IEC 4873 levels.	-	m	-	
10a	Redesignation escape sequences.	x	i		
10b	Receiver treats as error?	-	o	-	
11a	A designation escape sequence which designates a coded character set other than IR 6 as G0.	x	i		
11b	Receiver treats as error?	-	o	-	
13a	A sending implementation shall send as part of its ISO/IEC 4873 version announcement (see requirement 9) a designation escape sequence to designate G0 as IR 6.	m	-		-
13b	A receiving implementation shall treat as an error the reception of a coded character in G0 before the reception of a designation escape sequence for G0 for IR 6.	-	o	-	
14	Support at least the operation of ISO/IEC 4873 level 1.	m	m		
15	A sending implementation which needs to support only 2 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 Level 1.	m	-		-
16a	Designation escape sequences for G2 and G3 when operating at ISO/IEC 4873 level 1 (by other decision or by default).	x	i		
16b	Receiver treats as error?	-	o	-	
17a, c	The support, for each registered character set that is claimed to be supported in GR over and above the default G-set, of the designation escape sequence for G1.	m	m		
18	When operating at ISO/IEC 4873 level 1, the support of designation escape sequences specifying an empty G1.	o	m		

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Ref.	Description	Status		Support	
		S	R	S	R
19a	A sending implementation which needs to support 3 or 4 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 2 or level 3.	c3	-		-
19b	A receiving implementation which needs to support 3 or 4 coded character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 3.	-	c4	-	
	For ISO/IEC 4873 level 2 or level 3				
20a	A sending implementation shall support, for each registered character set it claims to support in GR over and above the default G-sets, the sending of designation escape sequences for at least one of G1, G2 and G3.	c3	-		-
20c	A receiving implementation shall support, for each registered coded character set it claims to support in GR, the reception of designation escape sequences for G1, G2, and G3.	-	c4	-	
21	When operating at ISO/IEC 4873 level 2 or level 3, the support of designation escape sequences for the empty G2 or G3 sets.	c5	c4		
22a	Designation sequences specifying IR 103 or IR 156 or any other registered character set containing non-spacing diacritical marks.	x	i		
22b	Receiver treats as error?	-	o	-	
23	The minimum graphic character repertoire support required for Western Europe is the 191 characters of ISO/IEC 8859-1 which consist of the graphic character repertoire of IR 6 (94 characters) plus the graphic character repertoire of IR 100 (96 characters) plus SPACE.	m	m		
27	An implementation shall set its default designation settings to default values at the beginning of an occurrence of this character string type.	m	m		
	The following designation defaults apply				
28a	G0 IR 006 ASCII (left hand part of ISO/IEC 8859-1)	m	m		
28b	G1 IR 100 Right hand part of ISO/IEC 8859-1	m	m		
28c	G2 The empty G2 set (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
28d	G3 The empty G3 set (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
29a	Locking shift functions other than LS1R, LS2R and LS3R.	x	i		
29b	Receiver treats as error?	-	o	-	
30a	The coding of any control function in an ESC Fe sequence.	x	i		
30b	Receiver treats as error?	-	o	-	
31a	When operating at ISO/IEC 4873 level 1 (by other decision or by default) the use of any single shift or any locking shift function.	x	i		
31b	Receiver treats as error?	-	o	-	
32	When operating at ISO/IEC 4873 level 2 (by other decision or by default) the use of any locking shift function.	c8	-		-

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Ref.	Description	Status		Support	
		S	R	S	R
33a	A sending implementation which claims to support the use of 3 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2, LS2R, SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	c3	-		-
33b	A sending implementation which claims to support the use of 4 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2 and LS2R and at least one of SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	c3	-		-
33c	A receiving implementation which needs to support the use of 3 or 4 coded graphic character sets concurrently shall support the reception of SS2, SS3, LS1R, LS2R and LS3R as defined in ISO/IEC 4873 level 2 and level 3	-	c4	-	
34a	When operating at ISO/IEC 4873 level 2 or level 3, the use of any single shift control function which attempts to invoke an empty cell of a code table into GL.	c9	c10		
34b	Receiver treats as error?	-	c16	-	
35	G0 is permanently invoked into GL.	m	m		
37	G1 is initially invoked into GR.	m	m		
38	The use of a G1 designation escape sequence invokes G1 into GR.	m	m		
39	The character coding that shall be used is defined in the code tables registered in the ISO International Register of Coded Character Sets to be Used with Escape Sequences.	m	m		
40a	Is there a requirement for every character to have a uniquely coded representation?	o	i		
40b	The use of any coded character that has not been taken from the lowest numbered G-set in which that character has been allocated.	c19	i		
40c	Receiver treats as error?	-	o	-	
41a	The use of any byte that represents an empty code table position.	x	i		
41b	Receiver treats as error?	-	o	-	
42a	The representation of the character DEL (coded as 07/15) in user data.	x	i		
42b	Receiver treats as error?	-	o	-	
44	The designation of the required G sets at the beginning of every instance of this string type where the requirement is different from the default designations	m	-		-

c3	if A.2.1.s or A.2.2.s then m else -
c4	if A.2.2.r then m else -
c5	if A.2.1.s or A.2.2.s then o else -
c8	if A.2.1.s and not A.2.2s then x else -
c9	if A.2.1.s or A.2.2.s then x else -
c10	if A.2.2.r then x else -
c16	if A.2.2.r then o else -
c19	if A.3.40as then x else o

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A.4 Requirements for ASN.1 Type GeneralString

Table A.4 - Primary requirements for ASN.1 type GeneralString

Ref.	Description	Status		Support	
		S	R	S	R
1	Support for ISO/IEC 4873 level 2	c1	o		
2	Support for ISO/IEC 4873 level 3	o	c2		
c1	if A.4.2.s then m else o				
c2	if A.4.1.r then m else i				

Table A.5 - Detailed requirements for ASN.1 type GeneralString

Ref.	Description	Status		Support	
		S	R	S	R
1	Operation in the 7-bit ISO/IEC 2022 code structure	x	x		
4a	Announcer sequences.	x	i		
4b	Receiver treats as an error?	-	o	-	
9a	A sending implementation may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences at the beginning of an instance of communication.	o	-		-
9b	A receiving implementation shall support designation escape sequences subject to its support of ISO/IEC 4873 levels.	-	m	-	
10a	Redesignation escape sequences.	x	i		
10b	Receiver treats as error?	-	o	-	
11a	A designation escape sequence which designates a coded character set other than IR 6 as G0.	x	i		
11b	Receiver treats as error?	-	o	-	
13a	A sending implementation shall send as part of its ISO/IEC 4873 version announcement (see requirement 9) a designation escape sequence to designate G0 as IR 6.	m	-		-
13b	A receiving implementation shall treat as an error the reception of a coded character in G0 before the reception of a designation escape sequence for G0 for IR 6.	-	o	-	
14	Support at least the operation of ISO/IEC 4873 level 1.	m	m		
15	A sending implementation which needs to support only 2 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 Level 1.	m	-		-
16a	Designation escape sequences for G2 and G3 when operating at ISO/IEC 4873 level 1 (by other decision or by default)	x	i		
16b	Receiver treats as error?	-	o	-	
17a, c	The support, for each registered character set that is claimed to be supported in GR over and above the default G-set, of the designation escape sequence for G1.	m	m		
17b, d	The support, for each registered C0 and C1 control set that is claimed to be supported over and above the default C-sets, of the designation escape sequence for C0 or C1 respectively.	m	m		
18	When operating at ISO/IEC 4873 level 1, the support of designation escape sequences specifying an empty G1 and an empty C1.	o	m		
19a	A sending implementation which needs to support 3 or 4 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 2 or level 3.	c3	-		-
19b	A receiving implementation which needs to support 3 or 4 coded character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 3.	-	c4	-	

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Ref.	Description	Status		Support	
		S	R	S	R
	For level 2 or level 3				
20a	A sending implementation shall support, for each registered character set it claims to support in GR over and above the default G-sets, the sending of designation escape sequences for at least one of G1, G2 and G3.	c3	-		-
20b	A sending implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support over and above the default C-sets, the sending of designation escape sequences for C0 and C1 respectively.	c3	-		-
20c	A receiving implementation shall support, for each registered coded character set it claims to support in GR, the reception of designation escape sequences for G1, G2, and G3.	-	c4	-	
20d	A receiving implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support, the reception of designation escape sequences for C0 and C1 respectively.	-	c4	-	
21	When operating at ISO/IEC 4873 level 2 or level 3, the support of designation escape sequences for the empty G2 or G3 sets.	c5	c4		
22a	Designation sequences specifying IR 103 or IR 156 or any other registered character set containing non-spacing diacritical marks.	x	i		
22b	Receiver treats as error?	-	o	-	
23	The minimum graphic character repertoire support required for Western Europe is the 191 characters of ISO/IEC 8859-1 which consist of the graphic character repertoire of IR 6 (94 characters) plus the graphic character repertoire of IR 100 (96 characters) plus SPACE.	m	m		
24	For all levels, the C0 set shall be used which contains ESCAPE coded as 01/11.	m	m		
25	For levels 2 and 3, the C0 set and the C1 set shall be used which contains SS2 coded as 08/14 and SS3 coded as 08/15.	c3	c4		
27	An implementation shall set its default designation settings to default values at the beginning of an occurrence of this character string type.	m	m		
	The following designation defaults apply				
28a	G0 IR 006 ASCII (left hand part of ISO/IEC 8859-1)	m	m		
28b	G1 IR 100 Right hand part of ISO/IEC 8859-1	m	m		
28c	G2 The empty G2 set (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
28d	G3 The empty G3 set (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
28e	C0 IR 001 C0 set of ISO 646 (the IRV)	m	m		
28f	C1 IR 105 Minimum C1 set for ISO/IEC 4873 (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
29a	Locking shift functions other than LS1R, LS2R and LS3R.	x	i		
29b	Receiver treats as error?	-	o	-	
30a	The coding of any control function in an ESC Fe sequence.	x	i		
30b	Receiver treats as error?	-	o	-	
31a	When operating at ISO/IEC 4873 level 1 (by other decision or by default) the use of any single shift or any locking shift function.	x	i		
31b	Receiver treats as error?	-	o	-	
32	When operating at ISO/IEC 4873 level 2 (by other decision or by default) the use of any locking shift function.	c8	-		-

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Ref.	Description	Status		Support	
		S	R	S	R
33a	A sending implementation which claims to support the use of 3 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2, LS2R, SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	c3	-		-
33b	A sending implementation which claims to support the use of 4 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2 and LS2R and at least one of SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	c3	-		-
33c	A receiving implementation which needs to support the use of 3 or 4 coded graphic character sets concurrently shall support the reception of SS2, SS3, LS1R, LS2R and LS3R as defined in ISO/IEC 4873 level 2 and level 3	-	c4	-	
34a	When operating at ISO/IEC 4873 level 2 or level 3, the use of any single shift control function which attempts to invoke an empty cell of a code table into GL.	c9	c10		
34b	Receiver treats as error?	-	c16	-	
35	G0 is permanently invoked into GL.	m	m		
36	C0 and C1 are permanently invoked into CL and CR respectively.	m	m		
37	G1 is initially invoked into GR.	m	m		
38	The use of a G1 designation escape sequence invokes G1 into GR.	m	m		
39	The character coding that shall be used is defined in the code tables registered in the ISO International Register of Coded Character Sets to be Used with Escape Sequences.	m	m		
40a	Is there a requirement for every character to have a uniquely coded representation?	o	i		
40b	The use of any coded character that has not been taken from the lowest numbered G-set in which that character has been allocated.	c19	i		
40c	Receiver treats as error?	-	o		
41a	The use of any byte that represents an empty code table position.	x	i		
41b	Receiver treats as error?	-	o	-	
42a	The representation of the character DEL (coded as 07/15) in user data.	x	i		
42b	Receiver treats as error?	-	o	-	
43	The designation of the required G sets and C sets at the beginning of every instance of this string type where the requirement is different from the default designations	m	-		-

c3 if A.4.1.s or A.4.2.s then m else -
c4 if A.4.2.r then m else -
c5 if A.4.1.s or A.4.2.s then o else -
c8 if A.4.1.s and not A.4.2s then x else -
c9 if A.4.1.s or A.4.2.s then x else -
c10 if A.4.2.r then i else -
c16 if A.4.2.r then o else -
c19 if A.5.40as then x else o

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A.5 Requirements for ASN.1 Type TeletexString

Table A.6 - Primary requirements for ASN.1 type TeletexString

Ref.	Description	Status		Support	
		S	R	S	R
1	Support for ISO/IEC 4873 level 2	i	i		
2	Support for ISO/IEC 4873 level 3	i	i		

Table A.7 - Detailed requirements for ASN.1 type TeletexString

Ref.	Description	Status		Support	
		S	R	S	R
1	Operation in the 7-bit ISO/IEC 2022 code structure	x	x		
4a	Announcer sequences.	x	i		
4b	Receiver treats as an error?	-	o	-	
9Ta	A sending implementation may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending designation escape sequences for G0 and/or G1 at the beginning of an instance of communication.	o	-		-
9Tb	A receiving implementation shall support designation escape sequences for G0 and G1.	-	m	-	
10a	Redesignation escape sequences.	x	i		
10b	Receiver treats as error?	-	o	-	
11Tac	The use as part of a ISO/IEC 4873 version announcement a designation escape sequence to designate G0 as IR 102 or IR 6.	o	m		
11Tbd	The use of a designation escape sequence which designates a coded character set other than IR 102 or IR 6 as G0.	x	i		
11Te	Receiver treats as error?	-	o	-	
16a	Designation escape sequences for G2 and G3 when operating at ISO/IEC 4873 level 1 (by other decision or by default)	x	i		
16b	Receiver treats as error?	-	o	-	
23	The minimum graphic character repertoire support required for Western Europe is the 191 characters of ISO/IEC 8859-1 which consist of the graphic character repertoire of IR 6 (94 characters) plus the graphic character repertoire of IR 100 (96 characters) plus SPACE.	m	m		
27	An implementation shall set its default designation settings to default values at the beginning of an occurrence of this character string type.	m	m		
28Ta	G0 IR 102 Teletex Primary Set of Graphic Characters CCITT Rec. T.61	m	m		
28Tb	G1 IR 103 Teletex Supplementary Set of Graphic Characters CCITT Rec. T.61	m	m		
28Tc	C0 IR 106 Teletex Primary Set of Control Functions CCITT Rec. T.61	m	m		
28Td	C1 IR 107 Teletex Supplementary Set of Control Functions CCITT Rec. T.61	m	m		
29a	Locking shift functions.	x	i		
29b	Receiver treats as error?	-	o	-	
30a	The coding of any control function in an ESC Fe sequence.	x	i		
30b	Receiver treats as error?	-	o	-	
31a	The use of any single shift or any locking shift function.	x	i		
31b	Receiver treats as error?	-	o	-	

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Ref.	Description	Status		Support	
		S	R	S	R
35	G0 is permanently invoked into GL.	m	m		
36	C0 and C1 are permanently invoked into CL and CR respectively.	m	m		
37	G1 is initially invoked into GR.	m	m		
38	The use of a G1 designation escape sequence invokes G1 into GR.	m	m		
39	The character coding that shall be used is defined in the code tables registered in the ISO International Register of Coded Character Sets to be Used with Escape Sequences.	m	m		
40a	Is there a requirement for every character to have a uniquely coded representation?	o	i		
40b	The use of any coded character that has not been taken from the lowest numbered G-set in which that character has been allocated.	c19	i		
40c	Receiver treats as error?	-	o	-	
41a	The use of any byte that represents an empty code table position.	x	i		
41b	Receiver treats as error?	-	o	-	
42a	The representation of the character DEL (coded as 07/15) in user data.	x	i		
42b	Receiver treats as error?	-	o	-	
43	The designation of the required G sets at the beginning of every instance of this string type where the requirement is different from the default designations	m	-		-
45	The implementation of the ASN.1 type *TeletexString* shall operate only at ISO/IEC 4873 level 1.	m	m		
46a	The use of a designation escape sequence for C0.	x	i		
46c	Receiver treats as error?	-	o	-	
46b	The use of a designation escape sequence for C1.	x	i		
46d	Receiver treats as error?	-	o	-	
47a	The use of a designation escape sequence for G1 other than for IR 103, IR 156 or IR 87.	x	i		
47e	Receiver treats as error?	-	o	-	
47b	The use of a designation escape sequence for G1 for IR 103.	o	m		
47c	The use of a designation sequence for G1 for IR 126	o	o		
47d	The use of a designation sequence for G1 for IR 156	o	o		
48a	The use of a non-spacing diacritical mark which is not immediately followed by a graphic character to form a character from the repertoire of ISO/IEC 6937.	x	i		
48b	Receiver treats as error?	-	o	-	
c19	if A.7.40as then x else o				

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A.6 Requirements for non-ASN.1 character string types

Table A.8 - Primary requirements for non-ASN.1 character string types

Ref.	Description	Status		Support	
		S	R	S	R
1	Support for ISO/IEC 4873 level 2	c1	o		
2	Support for ISO/IEC 4873 level 3	o	c2		
3	Support for announcer sequences	o	o		
c1: if A.8.2.s then m else o c2: if A.8.1.r then m else i					

Table A.9 - Detailed requirements for non-ASN.1 character string types

Ref.	Description	Status		Support	
		S	R	S	R
1	Operation in the 7-bit ISO/IEC 2022 code structure	x	x		
2a	A sending implementation which claims support of announcer sequences shall send an announcer escape sequence at the beginning of an instance of an instance of communication to announce the level of ISO/IEC 4873 being proposed in that direction of data flow and shall support the semantics of that announcer sequence.	c11	-		-
2b	A receiving implementation which claims support of announcer sequences shall be capable of receiving an announcer escape sequence to announce the level of ISO/IEC 4873 being proposed in that direction of data flow and shall support the semantics of that announcer sequence.	-	c12	-	
3a	A sending implementation which does not claim support of announcer sequences shall not send any announcer sequences.	c13	-		-
3b	A receiving implementation that does not support announcer sequences shall be capable of receiving an announcer sequence without malfunction, but shall ignore it (i.e. take no action as a result).	-	c14	-	
5a	A sending implementation that supports announcer sequences shall identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences immediately after the announcer escape sequence at the beginning of an instance of communication.	c11	-		-
5b	A receiving implementation that supports announcer sequences shall support the semantics of a ISO/IEC 4873 version announcement subject to its support of ISO/IEC 4873 levels.	-	c12	-	
6a	If a sending implementation that supports announcer sequences wishes to redesignate a G-set during an instance of communication, it shall send a complete announcement sequence of announcer plus set of designation escape sequences.	c11	-		-
6b	A receiving implementation that supports announcer sequences shall support redesignation.	-	c12	-	
6c	A receiving implementation which supports announcer sequences may treat as an error the receipt of an escape sequence redesignating a G-set which is not preceded by an announcement sequence.	-	c17	-	
7a	A sending implementation that does not support announcer sequences may identify the version of ISO/IEC 4873 to be used in that direction of data flow by sending one or more designation escape sequences at the beginning of an instance of communication.	c15	-		-
7b	A receiving implementation that does not support announcer sequences shall support designation escape sequences subject to its support of ISO/IEC 4873 levels.	-	c14	-	

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Ref.	Description	Status		Support	
		S	R	S	R
8a	A sending implementation that does not support announcer sequences shall not attempt to redesignate during an instance of communication.	c13	-		-
8b	A receiving implementation that does not support announcer sequences may treat as an error the reception of a redesignation escape sequence.	-	c18	-	
11a	A designation escape sequence which designates a coded character set other than IR 6 as G0.	x	i		
11b	Receiver treats as error?	-	o	-	
12	The use of a designation escape sequence for G0 for IR 6.	o	m		
14	Support at least the operation of ISO/IEC 4873 level 1.	m	m		
15	A sending implementation which needs to support only 2 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 Level 1.	m	-		-
16a	Designation escape sequences for G2 and G3 when operating at ISO/IEC 4873 level 1 (by other decision or by default)	x	i		
16b	Receiver treats as error?	-	o	-	
17a, c	The support, for each registered character set that is claimed to be supported in GR over and above the default G-set, of the designation escape sequence for G1.	m	m		
17b, d	The support, for each registered C0 and C1 control set that is claimed to be supported over and above the default C-sets, of the designation escape sequence for C0 or C1 respectively.	m	m		
18	When operating at ISO/IEC 4873 level 1, the support of designation escape sequences specifying an empty G1 and an empty C1.	o	m		
19a	A sending implementation which needs to support 3 or 4 coded graphic character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 2 or level 3.	c3	-		-
19b	A receiving implementation which needs to support 3 or 4 coded character sets concurrently as G-sets shall operate at ISO/IEC 4873 level 3.	-	c4	-	
	For level 2 or level 3				
20a	A sending implementation shall support, for each registered character set it claims to support in GR over and above the default G-sets, the sending of designation escape sequences for at least one of G1, G2 and G3.	c3	-		-
20b	A sending implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support over and above the default C-sets, the sending of designation escape sequences for C0 and C1 respectively.	c3	-		-
20c	A receiving implementation shall support, for each registered coded character set it claims to support in GR, the reception of designation escape sequences for G1, G2, and G3.	-	c4	-	
20d	A receiving implementation shall support, for each registered C0 control set and each registered C1 control set it claims to support, the reception of designation escape sequences for C0 and C1 respectively.	-	c4	-	
21	When operating at ISO/IEC 4873 level 2 or level 3, the support of designation escape sequences for the empty G2 or G3 sets.	c5	c4		
22a	Designation sequences specifying IR 103 or IR 156 or any other registered character set containing non-spacing diacritical marks.	x	i		
22b	Receiver treats as error?	-	o	-	
23	The minimum graphic character repertoire support required for Western Europe is the 191 characters of ISO/IEC 8859-1 which consist of the graphic character repertoire of IR 6 (94 characters) plus the graphic character repertoire of IR 100 (96 characters) plus SPACE.	m	m		
24	For all levels, the C0 set shall be used which contains escape coded as 01/11.	m	m		
25	For levels 2 and 3, the C0 set and the C1 set shall be used which contains SS2 coded as 08/14 and SS3 coded as 08/15.	c3	c4		

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Ref.	Description	Status		Support	
		S	R	S	R
26	When an announcer sequence occurs all designation settings shall be set to default values.	m	m		
	The following designation defaults apply				
28a	G0 IR 006 ASCII (left hand part of ISO/IEC 8859-1)	m	m		
28b	G1 IR 100 Right hand part of ISO/IEC 8859-1	m	m		
28c	G2 The empty G2 set (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
28d	G3 The empty G3 set (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
28e	C0 IR 001 C0 set of ISO 646 (the IRV)	m	m		
28f	C1 IR 105 Minimum C1 set for ISO/IEC 4873 (ISO/IEC 4873 level 2 or 3 only)	c3	c4		
29a	Locking shift functions other than LS1R, LS2R and LS3R.	x	i		
29b	Receiver treats as error?	-	o	-	
30a	The coding of any control function in an ESC Fe sequence.	x	i		
30b	Receiver treats as error?	-	o	-	
31a	When operating at ISO/IEC 4873 level 1 (by other decision or by default) the use of any single shift or any locking shift function.	x	i		
31b	Receiver treats as error?	-	o	-	
32	When operating at ISO/IEC 4873 level 2 (by other decision or by default) the use of any locking shift function.	c8	-		-
33a	A sending implementation which claims to support the use of 3 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2, LS2R, SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	c3	-		-
33b	A sending implementation which claims to support the use of 4 coded graphic character sets concurrently shall optionally support the sending of LS1R, and shall support the sending of at least one of SS2 and LS2R and at least one of SS3 and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	c3	-		-
33c	A receiving implementation which needs to support the use of 3 or 4 coded graphic character sets concurrently shall support the reception of SS2, SS3, LS1R, LS2R and LS3R as defined in ISO/IEC 4873 level 2 and level 3.	-	c4	-	
34a	When operating at ISO/IEC 4873 level 2 or level 3, the use of any single shift control function which attempts to invoke an empty cell of a code table into GL.	c9	c10		
34b	Receiver treats as error?	-	c16	-	
35	G0 is permanently invoked into GL.	m	m		
36	C0 and C1 are permanently invoked into CL and CR respectively.	m	m		
37	G1 is initially invoked into GR.	m	m		
38	The use of a G1 designation escape sequence invokes G1 into GR.	m	m		
39	The character coding that shall be used is defined in the code tables registered in the ISO International Register of Coded Character Sets to be Used with Escape Sequences.	m	m		
40a	Is there a requirement for every character to have a uniquely coded representation?	o	i		
40b	The use of any coded character that has not been taken from the lowest numbered G-set in which that character has been allocated.	c19	i		
40c	Receiver treats as error?	-	o	-	
41a	The use of any byte that represents an empty code table position.	x	i		
41b	Receiver treats as error?	-	o	-	

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Ref.	Description	Status		Support	
		S	R	S	R
42a	The representation of the character DEL (coded as 07/15) in user data.	x	i		
42b	Receiver treats as error?	-	o	-	
43	The designation of the required G sets at the beginning of every instance of this string type where the requirement is different from the default designations	m	-		-
c3	if A.8.1.s or A.8.2.s then m else -				
c4	if A.8.2.r then m else -				
c5	if A.8.1.s or A.8.2.s then o else -				
c8	if A.8.1.s and not A.8.2s then x else -				
c9	if A.8.1.s or A.8.2.s then x else -				
c10	if A.8.2.r then i else -				
c11	if A.8.3.s then m else -				
c12	if A.8.3.r then m else -				
c13	if A.8.3.s then - else m				
c14	if A.8.3.r then - else m				
c15	if A.8.3.s then - else o				
c16	if A.8.2.r then o else -				
c17	if A.8.3.r then o else -				
c18	if A.8.3.r then - else o				
c19	if A.9.40as then x else o				

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Annex B

(informative)

TeletexString Compatibility

The use of ISO/IEC 4873 is at present incompatible with CCITT T.61:1988 (see also ISO 6937:1983). CCITT T.61:1988 forms the basis of the specification of ASN.1 type *TeletexString* and requires the use of IR 102 to be permanently designated as G0 and invoked in GL. ASN.1 type *TeletexString* is used in the MHS and Directory Service standards. IR 102 differs from IR 6 in a number of code table positions as shown in the following table:

Code Table Position Byte	IR 102 - Teletex Primary Set	IR 6 - ISO 646 1990 IRV
02/04	unassigned	$ Dollar Sign
05/12	unassigned	\ Reverse Solidus
05/14	unassigned	^ Circumflex Accent
07/11	unassigned	{ Left Curly Bracket
07/13	unassigned	} Right Curly Bracket
07/14	unassigned	~ Tilde

The following observations are made:

- It can be seen that IR 102 is a subset of IR 6.

- Both CCITT T.51:1992 and ISO/IEC 6937:1994 are new revisions which align their primary sets with IR 6. Both ISO/IEC 6937:1994 and CCITT T.51:1992 now refers to IR 6 as the primary set. ISO/IEC 8824-1:1995 has been revised to align the specification of *TeletexString* (i.e. reference IR 6 instead of IR 102). *TeletexString:1993* operation is therefore conformant with ISO/IEC 4873.

- A problem arises with the interoperability of implementations of ISO/IEC 8825:1990 and implementations of a new edition which aligns *TeletexString*.

The following rules are suggested to assist interoperability:

- New receiving implementations of the old standard should tolerate the reception of the listed bytes above (ie not malfunction) but need not support their semantics. They should treat the reception of a designation escape sequence for IR 6 as if it were for IR 102.

- New sending implementations of the new standard should avoid use of the listed bytes above if it is known that a corresponding implementation only supports the old standard. In this case, designation of IR6 should be avoided also.

- New receiving implementations of the new standard should tolerate reception of a designation escape sequence for IR 102 and should either implement its full semantics or treat it as if it were for IR 6. In the latter case, the receipt of byte 10/04 (dollar sign) should be treated as if were byte 02/04.

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Annex C

(informative)

GeneralString and GraphicString Compatibility

The following rules for the use of ASN.1 types *GeneralString* and *GraphicString* should be followed to ensure interoperability between implementations of ISO/IEC 8824:1990 and ISO/IEC 8824-1:1995 (the second and third editions).

- Sending implementations of ISO/IEC 8824-1:1995 should place a designation sequence for IR6 for G0 at the beginning of each occurrence of ASN.1 type *GeneralString* and *GraphicString*. This will allow interoperability with receiving implementations of edition 2.

- Receiving implementations of ISO/IEC 8824-1:1995 should be able to handle correctly a designation sequence for IR6 for G0 at the beginning of each occurrence of ASN.1 type *GeneralString* and *GraphicString*.

In other words, requirements 12b and 13a of this part of ISO/IEC ISP 12070 should still apply to implementations of ISO/IEC 8824-1:1995.

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