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Information technology — International
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set 8-bit code structure based on

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FCS111 — 2022 Option 1

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*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
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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-Oceania 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.

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.

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.

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 8859-1¹, *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)

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

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.

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

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*.

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)

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