

Date and time — Reference time scales

Working Draft Standard

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Foreword

The Calendaring and Scheduling Consortium (“CalConnect”) is a global non-profit organization with the aim to facilitate interoperability of collaborative technologies and tools through open standards.

CalConnect works closely with international and regional partners, of which the full list is available on our website (<https://www.calconnect.org/about/liaisons-and-relationships>).

The procedures used to develop this document and those intended for its further maintenance are described in the CalConnect Directives.

In particular the different approval criteria needed for the different types of CalConnect documents should be noted. This document was drafted in accordance with the editorial rules of the CalConnect Directives.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CalConnect shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be provided in the Introduction.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

This document was prepared by Technical Committee *DATETIME*.

Introduction

General

This international standard describes the concepts, data model representations, and universally applicable coded representations of reference time scales and their authorities.

It belongs to the same family of standards as [ISO 8601-1:2019](#) and [ISO 8601-2:2019](#), the international standards for date and time representation.

This international standard provides code lists that facilitates the representation of a reference time scale. Such representation is crucial in knowing the basis of a timestamp, for example, in the fields of legal metrology, meteorology, astronomy and geoinformatics.

Concepts

This document aims to standardize the concept of a reference time scale, its parameters and associated concepts for the use of the international community.

In particular, these concepts are defined in this document:

- reference time scale; and
- reference time scale authority.

Data models

This document provides a number of data models that defines reference time scales and related concepts in fine resolution, allowing compliant implementations to be able to interoperate.

Coded representations

This international standard establishes codes that represent the following attributes, current or in the past, on the basis of data obtained from official sources:

- names of reference time scales; and
- names of reference time scale authorities.

Registration authority of code lists

This document specifies a registration authority that manages and disseminates the code lists required by this document.

The registration authority is not meant to replace existing computer reference time scale databases, but meant to serve authoritative reference time scale information created by the reference time scale authorities, and can be used as an upstream information source to synchronize existing reference time scale databases.

The mechanism of reference time scale registration given in this international standard empowers reference time scale authorities to publish digital definitions of their reference time scales themselves, therefore allowing users to directly obtain authoritative reference time scale information from the reference time scale authorities.

Priority for practice

This document aims to provide interoperable representations and mechanisms for the use and management of reference time scales.

It does not express any opinion whatsoever concerning the legal status of any country, dependency, or other area named herein, or concerning its frontiers or boundaries.

Date and time — Reference time scales

1. Scope

This document describes the concepts and definitions related to time scales, including:

- time scales; and
- time scale authorities.

This document also establishes codes that represent the following attributes, current or in the past, on the basis of data obtained from official sources:

- names of time scales; and
- names of time scale authorities.

This document specifies a registration authority that manages and disseminates the code lists required by this document.

This document is intended for use in any application requiring the expression of time scale names and time scale authority names in coded form. It also includes basic guidelines for its implementation and maintenance.

Methods of using codes provided in this document for indication of time scales or related concepts are not covered in this document.

2. Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8601-1:2019, International Organization for Standardization (committee). *Date and time — Representations for information interchange — Part 1: Basic rules*. First edition. 2019. Geneva: International Organization for Standardization. <https://www.iso.org/standard/70907.html>.

ISO 8601-2:2019, International Organization for Standardization (committee). *Date and time — Representations for information interchange — Part 2: Extensions*. First edition. 2019. Geneva: International Organization for Standardization. <https://www.iso.org/standard/70908.html>.

ISO 639-1:2002, International Organization for Standardization (committee). *Codes for the representation of names of languages — Part 1: Alpha-2 code*. First edition. 2002. Geneva: International Organization for Standardization. <https://www.iso.org/standard/22109.html>.

ISO 15924:2004, International Organization for Standardization (committee). *Information and documentation — Codes for the representation of names of scripts*. First edition. 2004. Geneva: International Organization for Standardization. <https://www.iso.org/standard/29546.html>.

ISO 3166-1:2013, International Organization for Standardization (committee). *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*. Third edition. 2013. Geneva: International Organization for Standardization. <https://www.iso.org/standard/63545.html>.

3. Terms and definitions

For the purposes of this document, the terms and definitions given in [ISO 8601-1:2019](#) and the following apply.

3.1.

code

set of data transformed or represented in different forms according to a pre-established set of rules

[SOURCE: [ISO 5127:2017, Clause 3.1.13.10](#)]

3.2.

code element

the result of applying a code to an element of a coded set

[SOURCE: [ISO/IEC 2382:2015, Clause 21215552](#)]

3.3.

reference time scale

time scale of generally agreed definition and rules used as a reference

Note 1 to entry: Common reference quantity measurements for time scales include atomic oscillations, earth rotation and celestial motion.

Note 2 to entry: The reference time scale is not always legally UTC in all countries.

Note 3 to entry: Reference time scales in use other than UTC include: UT, TAI, GMT, GPS system time, Galileo system time, BeiDou system time, LORAN station system time.

3.4.

civil time scale

time scale based on a *reference time scale* ([Clause 3.3](#)) with an offset determined through administration

3.5.

time scale authority

entity assigned to oversee determination and regulation of a *reference time scale* ([Clause 3.3](#))

Note 1 to entry: The GMT time scale was published by BIH until GMT was superseded by UT, which is now published by IERS.

Note 2 to entry: The reference time scale for a country is generally set by a national time lab. For example, NIST is a time scale authority since 1967-04-28 21:00.

Note 3 to entry: BIPM Circular T provides a list of the national time authorities who are members and who participate in the construction of TAI and UTC.

EXAMPLE 1 BIPM is the time scale authority of UTC and TAI.

EXAMPLE 2 NIST is the time scale authority of UTC(NIST).

3.6.

time scale identifier

code ([Clause 3.1](#)) that represents indicates a time scale

3.7.

time scale authority identifier

code ([Clause 3.1](#)) that represents indicates a *time scale authority* ([Clause 3.5](#))

3.8. official time scales authority

governmental agency or office with the responsibility of a *time scale authority* ([Clause 3.5](#)) within a country, jurisdiction, or assigned territory

EXAMPLE The US Department of Transport is an official time scale authority carrying authority of the United States.

3.9. unofficial time scale authority

time scale authority ([Clause 3.5](#)) that is not an *official time scale authority* ([Clause 3.8](#)) or *international time scale authority* ([Clause 3.10](#))

EXAMPLE The University of California Observatories is an unofficial time scale authority.

3.10. international time scale authority

time scale authority ([Clause 3.5](#)) that operates under international scope and whose decisions for *reference time scales* ([Clause 3.3](#)) management are made with international participation

EXAMPLE The BIPM is an international time scale authority.

3.11. language identifier

information which indicates the name of a language

[SOURCE: [ISO 639-1:2002, Clause 3.3](#)]

3.12. script

combination of characters used to represent the name of a script

[SOURCE: [ISO 15924:2004, Clause 3.8](#)]

3.13. ISO 3166 code

identifier provided by the ISO 3166 series of standards listing of country names with their representations by code elements

[SOURCE: [ISO 3166-1:2013, Clause 3.3](#), modified — term changed to “ISO 3166 code” to reflect origin.]

3.14. country name

name of a country, dependency, or other area of particular geopolitical interest

[SOURCE: [ISO 3166-1:2013, Clause 3.4](#)]

4. Common data attributes

4.1. General

4.2. Usage of ISO 3166 code elements

The [ISO 3166-1:2013](#) alpha-2 code list is used in this document to represent entities or data to indicate names of country or regions.

These alpha-2 codes from [ISO 3166-1:2013](#) are used in this document for the following meanings that differ from their assignment in [ISO 3166-1:2013](#):

- 1) AA represents entities that are international in nature (such as the BIPM) or data intended for international application (such as the TODO NEED EXAMPLE), (assigned as a “user-assigned code element” in [8.1.3](#));
- 2) XZ represents entities that are located in international waters or data intended for application at international waters (assigned as a “user-assigned code element” in [8.1.3](#));

NOTE The usage of XZ echos the identical practice of [UN/LOCODE](#).

- 1) ZZ represents entities not operating under or endorsed officially by UN member states, or data intended for unofficial use (assigned as a “user-assigned code element” in [8.1.3](#));
- 2) the range XA to XZ is reserved for user private use, such as to represent entities or data not provided by this document and not meant to be used publicly (assigned as “user-assigned code elements” in [8.1.3](#));
- 3) EU represents entities that operate under authority of the European Union, or data that is intended to apply to the European Union (as listed an “exceptionally reserved” element at [ISO 3166/MA](#));
- 4) UN represents entities that operate under authority of the United Nations or its specialized agencies, or data that is intended for United Nations members or its specialized agencies (as listed an “exceptionally reserved” element at [ISO 3166/MA](#)).

4.3. Data models

The following data models are common to the data models specified in [Clause 5](#) and [Clause 6](#).

4.3.1. Localization

LocalizationString represents a single string.

LocalizationCollection represents a collection of localized strings.

The script tag uses script codes from [ISO 15924:2004](#) and language codes from [ISO 639-1:2002](#).

```
skinparam Dpi 150
skinparam Monochrome false
skinparam LineType ortho
hide circle
/' skinparam CircledCharacterRadius 0 '/'
/' skinparam CircledCharacterFontSize 0 '/'
skinparam Default {
    TextAlignment center
    FontName Helvetica
}
skinparam Class {
    AttributeIconSize 0
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    StereotypeFontSize 10
}
skinparam Rectangle {
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    FontSize 11
```

```

    StereotypeFontSize 10
}
skinparam Object {
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    FontSize 11
    StereotypeFontSize 10
}

skinparam Entity {
    StereotypeFontSize 10
}

'***** CLASS DEFINITION *****'
class LocalizedStringCollection {
    +content: LocalizedString[1..*]
    +localetag: LocalizationTag[0..1]
}

class LocalizationTag {
    +language: iso639Code
    +script: iso15924Code
}

class LocalizedString {
    +content: String
    +localetag: LocalizationTag[0..1]
}

class iso639Code <<dataType>>{
}

class iso15924Code <<dataType>>{
}
LocalizedStringCollection <-- LocalizationTag
LocalizedStringCollection <-- LocalizedString
LocalizedString <-- LocalizationTag
LocalizationTag <-- iso639Code
LocalizationTag <-- iso15924Code

```

Figure 1

5. Reference time scale authority

5.1. General

A reference time scale authority is a competent authority that creates, publishes and/or manages definitions of reference time scales and their changes.

5.2. Requirements of a reference time scale authority

A reference time scale authority must be competent.

5.2.1. Competency

A competent reference time scale authority is one that has standardized processes surrounding the management of the reference time scales, covering at least the following processes:

- 1) Planning of reference time scales, including the process of designing and defining a reference time scale.
- 2) Performing changes to reference time scales are well planned and executed in a manner that is considerate of reference time scale users.
- 3) Public announcement and dissemination of its reference time scale.
- 4) Authoritative announcement of current time under a reference time scale under its management.
- 5) Allows a public review period for people affected by reference time scales under its management prior to enactment.

5.3. Types of reference time scale authorities

5.3.1. International reference time scale authorities

International reference time scale authorities are listed with the [ISO 3166-1:2013](#) code AA.

It is defined as a reference time scale authority that:

- 1) operates under international scope; and
- 2) whose decisions for reference time scale management are made with international participation.

EXAMPLE

The BIPM is an international reference time scale authority.

5.3.2. Official reference time scale authority

An official reference time scale authority is appointed by a local or regional governmental body, whereas the authority for appointment comes from a United Nations member state.

EXAMPLE

The US NIST with the code us-nist, publishes reference time scales that apply to the territory of United States.

5.3.3. Unofficial reference time scale authority

An unofficial reference time scale authority is a reference time scale authority not appointed by a United Nations member state. These authorities must be competent with regards to reference time scale management and can publish reference time scales used by communities.

5.4. Registration of reference time scale authorities

The ISO 34100/AG is tasked with managing a list of reference time scale authorities.

5.5. Data model and attributes

5.5.1. General

```
skinparam Dpi 150  
skinparam Monochrome false
```

```

skinparam LineType ortho
hide circle
/' skinparam CircledCharacterRadius 0 '/'
/' skinparam CircledCharacterFontSize 0 '/'
skinparam Default {
    TextAlignment center
    FontName Helvetica
}
skinparam Class {
    AttributeIconSize 0
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    StereotypeFontSize 10
}
skinparam Rectangle {
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    FontSize 11
    StereotypeFontSize 10
}
skinparam Object {
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    FontSize 11
    StereotypeFontSize 10
}

skinparam Entity {
    StereotypeFontSize 10
}

class AuthorityInfo {
    +authorityCode: String
    +uri: Uri
    +name: LocalizedStringCollection
    +iso3166Code: iso3166Code
    +description: LocalizedStringCollection
    ' +publicKey: PublicKey
}

class OfficialAuthorityInfo extends AuthorityInfo {
}

class InternationalAuthorityInfo extends AuthorityInfo {
    +iso3166Code: iso3166Code = AA
}

class UnofficialAuthorityInfo extends AuthorityInfo {
    +iso3166Code: iso3166Code = ZZ
}

'class SignatureInfo {
    ' +signature: String

```

```

' +algorithm: iso148880id
' +publicKeyUri: Uri
'}
'
'class PublicKey {
' +algorithm: iso148880id
' +content: String
' +uri: Uri
' +validity: ValidityInfo
'}

'class iso148880id <<dataType>>{
'
'}

***** CLASS RELATIONS *****
'SignatureInfo <-- iso148880id
'AuthorityInfo <-- PublicKey

```

Figure 2**5.5.2. Reference time scale authority code**

A code that represents the reference time scale authority.

5.5.3. ISO 3166 alpha-2-code

A code that represents the jurisdictional authority of the reference time scale authority.

EXAMPLE

NIST is the authoritative reference time scale authority of the United States, with the code US.

5.5.4. English short name

The identifiable short name that uniquely identifies the reference time scale authority within its ISO 3166 code.

5.5.5. Abbreviation

The identifiable abbreviation used for the reference time scale authority.

5.5.6. Remarks

Any further notes.

5.6. Code and identifier**5.6.1. Principles for inclusion in the list of reference time scale authorities****5.6.1.1. List**

The list of reference time scale authorities in this document includes known authorities from regions consisting of [ISO 3166-1:2013](#) codes through official sources.

5.6.1.2. Source of names

Names and abbreviations of reference time scales are obtained from the reference time scale authorities or official sources.

5.6.1.3. Overlaps

Some reference time scale authorities cover areas that have also been coded separately where an interchange requirement justifies a separate code element; the entries are therefore not mutually exclusive.

EXAMPLE 1

The China National Time Service Center, with the code `cn-ntsc`, publishes reference time scales that contribute to the UTC time scale.

EXAMPLE 2

The Hong Kong Observatory with the code `hk-hko`, publishes reference time scales that contribute to the UTC time scale.

5.6.1.4. Current status of names

Reference time scale authorities listed in this document are intended to reflect the current situation, at the time of issue of the latest update of this document.

5.6.2. Principles for allocation of code elements

5.6.2.1. Relationship with names

The principle behind the alphabetic codes for reference time scale authorities is a visual association between the reference time scale authorities and their corresponding code elements.

In applying this principle, the code elements have generally been assigned on the basis of the abbreviated names of the reference time scale authorities, thus avoiding, wherever possible, any reflection of their political status.

Official reference time scale identifiers are in the following format:

```
[iso-3166-code] - [reference-time-scale-authority-identifier]
```

Figure 3

EXAMPLE 1

`hk-hko` for the Hong Kong Observatory.

The [ISO 3166-1:2013](#) private code point `AA` is used as a prefix for international reference time scales.

```
aa - [reference-time-scale-authority-identifier]
```

Figure 4

EXAMPLE 2

`aa-bipm` for the BIPM.

The [ISO 3166-1:2013](#) private code point ZZ is used as a prefix for all unofficial reference time scale authorities.

In terms of coding, official reference time scale authority-identifiers are in the following format:

zz-[reference-time-scale-authority-identifier]

Figure 5

5.6.2.2. Construction of the alphabetic code

The following rules are to be adhered to for the assignment of the alphabetic code:

- The alphabetic code uses combinations, in upper case, of a maximum of 16 letters of the 26-character Latin alphabet with the “dash” (-).
- To encourage descriptive and distinguishable alphabetic names, the minimum length of the reference time scale identifier without the [ISO 3166-1:2013](#) code is 3 letters.
- The specific code prefix of XX is reserved and is used as the prefix of user-assignable reference time scale codes.

5.6.2.3. User assigned code elements

If users need code elements to represent reference time scales not included in the reference time scale registry, the [ISO 3166-1:2013](#) code prefix of XX can be used, being a reserved code point XX for private user assignment.

The code length for the reference time scale identifier must be 3 or more letters.

Such reference time scale identifiers are in the following format:

xx-[reference-time-scale-authority-identifier]

Figure 6

NOTE Users are advised that the above series of codes are not universals, those code elements are not compatible between different entities.

5.6.3. List of reference time scale authorities and their code elements

The list of items composing the content of the country code is initially defined in [Appendix B](#). Additional and new entries will be listed by the ISO 34100/AG.

Data attributes provided in the list are defined in [Clause 5.5](#).

6. Reference time scale

6.1. General

Reference time scales are created and managed by time authorities.

Reference time scales can contain time modification records. For example, the UTC time scale provides a list of leap seconds that adjusted UTC time since its inception.

6.2. Types of reference time scales

6.2.1. International reference time scales

International reference time scales are reference time scales that apply internationally without regard to geolocation.

EXAMPLE

UTC and TAI are international reference time scales.

6.2.2. Official reference time scales

Official reference time scales are created by official reference time scale authorities and international reference time scale authorities.

6.2.3. Unofficial reference time scales

Unofficial reference time scales can be created by any reference time scale authority.

6.3. Registration of reference time scales

The ISO 34100/AG is tasked with managing a list of reference time scales.

6.4. Data model and attributes

6.4.1. General

```
skinparam Dpi 150
skinparam Monochrome false
skinparam LineType ortho
hide circle
/' skinparam CircledCharacterRadius 0 '/'
/' skinparam CircledCharacterFontSize 0 '/'
skinparam Default {
    TextAlignment center
    FontName Helvetica
}
skinparam Class {
    AttributeIconSize 0
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    StereotypeFontSize 10
}
skinparam Rectangle {
    BackgroundColor White
    ArrowColor Black
    BorderColor Black
    FontStyle bold
    FontSize 11
    StereotypeFontSize 10
}
skinparam Object {
    BackgroundColor White
    ArrowColor Black
```

```

    BorderColor Black
    FontStyle bold
    FontSize 11
    StereotypeFontSize 10
}

skinparam Entity {
    StereotypeFontSize 10
}

'***** CLASS DEFINITION *****
class ReferenceTimeScale {
    +id: Uid
    +authority: AuthorityInfo
    +name: LocalizedStringCollection
    +description: LocalizedStringCollection
    +leapSeconds: LeapSecondRecord[0..*]
}

'class LeapSecondRecord {
    +time: iso8601DateTime
    +seconds: Integer
}

'***** NOTES *****
'ReferenceTimeScale <|-down- LeapSecondRecord

```

Figure 7**6.4.2. Reference time scale code**

A code that represents the reference time scale.

6.4.3. ISO 3166 alpha-2-code

A code that represents the geographic applicability of the reference time scale.

EXAMPLE

UTC time applies globally with the code aa.

6.4.4. Internationally recognized short name

The internationally recognized short name that uniquely identifies the reference time scale.

6.4.5. Abbreviation

The identifiable abbreviation used for the reference time scale. This is optional.

6.4.6. Reference time scale authority code

A code that represents the reference time scale authority who manages this reference time scale.

6.4.7. Remarks

Any further notes.

6.4.8. Leap seconds

A record of positive or negative leap seconds applied to the reference time scale at the described date.

EXAMPLE 1

UTC leap seconds are provided since its inception in 1972.

EXAMPLE 2

Leap seconds does not apply to the GMT reference time scale.

6.5. Code and identifier

6.5.1. Principles for inclusion in the list of reference time scales

6.5.1.1. List

The list of reference time scales in this document includes known reference time scales from official sources.

6.5.1.2. Source of names

Names and abbreviations of reference time scales are obtained from the reference time scale authorities or other official sources.

6.5.1.3. Overlaps

Some reference time scales cover areas that have also been coded separately where an interchange requirement justifies a separate code element; the entries are therefore not mutually exclusive.

EXAMPLE 1

aa-utc applies internationally.

EXAMPLE 2

us-gps applies to the United States.

6.5.1.4. Current status of names

Reference time scales listed in this document are intended to reflect the current situation, at the time of issue of the latest update of this document.

6.5.2. Principles for allocation of code elements

6.5.2.1. Relationship with names

Official reference time scale identifiers are in the following format:

[iso-3166-code] - [reference-time-scale-identifier]

Figure 8

EXAMPLE 1

hk-utchk for the UTC(Hong Kong) reference time scale managed by the Hong Kong Observatory.

The [ISO 3166-1:2013](#) private code point AA is used as a prefix for international reference time scales.

aa-[reference-time-scale-identifier]

Figure 9**EXAMPLE 2**

aa-utc for the UTC reference time scale managed by the BIPM.

The [ISO 3166-1:2013](#) private code point ZZ is used as a prefix for all unofficial reference time scales.

In terms of coding, official reference time scale identifiers are in the following format:

zz-[reference-time-scale-authority-identifier]-[reference-time-scale-identifier]

Figure 10**6.5.2.2. Construction of the alphabetic code**

The following rules are to be adhered to for the assignment of the alphabetic code:

- The alphabetic code uses combinations, in upper case, of a maximum of 16 letters of the 26-character Latin alphabet with the “dash” (-).
- To encourage descriptive and distinguishable alphabetic names, the minimum length of the reference time scale identifier without the [ISO 3166-1:2013](#) code is 3 letters.
- The specific code prefix of XX is reserved and is used as the prefix of user-assignable reference time scale codes.

6.5.2.3. User assigned code elements

If users need code elements to represent reference time scales not included in the reference time scale registry, the [ISO 3166-1:2013](#) code prefix of XX can be used, being a reserved code point XX for private user assignment.

The code length for the reference time scale identifier must be 3 or more letters.

Such reference time scale identifiers are in the following format:

xx-[reference-time-scale-authority-identifier]-[reference time scale-identifier]

Figure 11

NOTE Users are advised that the above series of codes are not universals, those code elements are not compatible between different entities.

6.5.3. List of reference time scale and their code elements

The list of items composing the content of the country code is initially defined in [Appendix C](#). Additional and new entries will be listed by the ISO 34100/AG.

Data attributes provided in the list is defined in [Clause 6.4](#).

Appendix A (normative) Registration

A.1. Registration authority (ISO 34100/RA)

A registration authority (ISO 34100/AG) has been appointed to operate under guidelines provided in this Annex. It has been entrusted with the following functions:

- 1) to add and eliminate reference time scales and their authorities, in accordance with the rules in this document;
- 2) to advise users and ISO member bodies regarding application of the codes;
- 3) to update and disseminate list of reference time scales, their authorities and their definitions;
- 4) to maintain a reference list of all reference time scales, their authorities and definitions;
- 5) to publish changes made to such information;
- 6) to administer the reservation of codes related to the list of reference time scales and their authorities.

Changes to this part of ISO 34100 are decided by the ISO 34100/AG and become effective immediately upon publication.

The criteria provided in [Appendix A.3](#) to 6.5 shall be observed by the ISO 34100/AG for changes to the list of country names in this part of ISO 34100, and their code elements, and for reservations of code elements.

A.2. Advisory group (ISO 34100/AG)

An advisory group (ISO 34100/AG) has been appointed to ensure the operations of the registration authority (ISO 34100/RA) are in accordance with guidelines provided in this Annex.

A.3. Addition to the list of reference time scale authorities

Additions to the list of reference time scales authorities shall be made on the basis of information from a member of the United Nations, or upon the request of a member of ISO 34100/AG.

In the latter case, the ISO 34100/AG will decide upon the addition, on the basis of the justification given for the actual requirements for international interchange. Code elements will be allocated accordingly.

Additions to the official and international time scale authorities require additional criteria:

- An official time scale authority must be endorsed by a body receiving direct authority by a member of the United Nations.
- An international time scale authority must be endorsed by an international standardization body in liaison with the ISO 34100/AG.

A.4. Addition to the list of reference time scales

Additions to the list of reference time scales shall be made only by the appropriate registered authority.

A.5. Deletion from the list of reference time scale authorities

Deletion from the list of reference time scales authorities shall be made on the basis of information from a member of the United Nations, or upon the request of a member of ISO 34100/AG.

The ISO 34100/AG will decide upon the deletion, on the basis of the information received. The corresponding code element is reserved.

A.6. Deletion of elements from the list of reference time scales

Deletion from the list of reference time scales shall be made only by the authority that registered the element.

The ISO 34100/AG will decide upon the deletion, on the basis of the information received. The corresponding code element is reserved.

A.7. Alterations to elements on list of reference time scales

Alterations to a registered element shall be made only by the authority that registered the element.

A significant change of name may require the ISO 34100/AG to change the alpha code element concerned. The ISO 34100/AG, however, shall endeavor to maintain stability in the list of code elements.

A.8. Advice regarding use of country code elements

The ISO 34100/AG is available for consultation and assistance on the use of country names in coded form. The ISO 34100/AG does not administer or maintain lists of user-assigned code elements

Appendix B (normative)

Alphabetical list of official reference time scale authorities in English and their code elements

Table B.1

Reference time scale authority identifier	ISO 3166 Alpha-2 Code	English short name	Abbreviation	Remarks
aa-bipm	aa	International Bureau of Weights and Measures	BIPM	
aa-iers	aa	International Earth Rotation and Reference Systems Service	IERS	
us-afspc	us	United States Air Force Space Command	AFSPC	
us-nist	us	United States National Institute of Standards and Technology	NIST	
us-dhs	us	United States Department of Homeland Security	DHS	
eu-esa	eu	European Space Agency	ESA	
eu-gsa	eu	European Global Navigation Satellite Systems Agency	GSA	
ru-rc	ru	Roscosmos State Corporation for Space Activities	Roscosmos	
cn-cnsa	cn	China National Space Administration	CNSA	

Appendix C (normative)

Alphabetical list of reference time scale names in English and their code elements

Table C.1

Reference time scale identifier	ISO 3166 Alpha-2 Code	English short name	Abbreviation	Authority	Remarks
aa-gmst	aa	Greenwich Mean Sidereal Time	GMST	aa-iers	
aa-lat	aa	Local Apparent Time	LAT	none	
aa-lmt	aa	Local Mean Time	LMT	none	
aa-tai	aa	International Atomic Time	TAI	aa-bipm	
aa-tcb	aa	Barycentric Coordinate Time	TCB	aa-iers	
aa-tcg	aa	Geocentric Coordinate Time	TCG	aa-iers	
aa-tdb	aa	Barycentric Dynamical Time	TDB	aa-iers	
aa-tt	aa	Terrestrial Time	TT	aa-iers	Previously TDT
aa-ut	aa	Universal Time	UT	aa-iers	Previously Greenwich Mean Time (GMT)
aa-utc	aa	Coordinated Universal Time	UTC	aa-bipm	
cn-bds	cn	BeiDou time	BDS	cn-cnsa	
eu-galileo	eu	Galileo time	Galileo	eu-esa, eu-gsa	
ru-glonass	ru	Global Navigation Satellite System time	GLONASS	ru-rc	
us-gps	us	Global Positioning System Time	GPS	us-afspc	

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