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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Data elements and interchange formats — Information interchange — Representation of dates and times

Éléments de données et formats d'échange — Échange d'information — Représentation de la date et de l'heure

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8601 was prepared by Technical Committee ISO/TC 154, *Documents and data elements in administration, commerce and industry.*

It cancels and replaces International Standards ISO 2014 : 1976, ISO 2015 : 1976, ISO 2711 : 1973, ISO 3307 : 1975 and ISO 4031 : 1978, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Contents

Data elements and interchange formats — Information interchange — Representation of dates and times

0 Introduction

0.1 Although ISO Recommendations and Standards in this field have been available since 1971, different forms of numeric representation of dates and times have been in common use in different countries. Where such representations are interchanged across national boundaries misinterpretation of the significance of the numerals can occur, resulting in confusion and other consequential errors or losses. The purpose of this International Standard is to eliminate the risk of misinterpretation and to avoid the confusion and its consequences.

0.2 This International Standard includes specifications for the numeric representation of information regarding date and time of the day.

0.3 In order to achieve similar formats for the representations of calendar dates, ordinal dates, dates identified by week number, periods of time, combined date and time of the day, and differences between local time and Coordinated Universal Time, and to avoid ambiguities between these representations, it has been necessary to use, apart from numeric characters, either single alphabetic characters or one or more other graphic characters or a combination of alphabetic and other characters in some of the representations.

0.4 The above action has had the benefit of enhancing the versatility and general applicability of previous International Standards in this field, and provides for the unique representation of any date or time expression or combination of these. Each representation can be easily recognized, which is beneficial when human interpretation is required.

0.5 This International Standard retains the most commonly used expressions for date and time of the day and their representations from the earlier International Standards and provides unique representations for some new expressions used in practice. Its application in information interchange, especially between data processing systems and associated equipment will eliminate errors arising from misinterpretation and the costs these generate. The promotion of this International Standard will not only facilitate interchange across international boundaries, but will also improve the portability of software, and will ease problems of communication within an organization, as well as between organizations.

0.6 Several of the alphabetic and graphic characters used in the text of this International Standard are common both to the representations specified and to normal typographical presentation.

0.7 To avoid confusion between the representations and the actual text, its punctuation marks and associated graphic characters, all the representations are contained in brackets [ ]. The brackets are not part of the representation, and should be omitted when implementing the representations. All matter outside the brackets is normal text, and not part of the representation. In the associated examples, the brackets and typographical markings are omitted.

1 Scope and field of application

This International Standard specifies the representation of dates in the Gregorian calendar and times and representations of periods of time. It includes

a) calendar dates expressed in terms of year, month and day of month;

b) ordinal dates expressed in terms of year and day of year;

c) dates identified by means of year, week numbers and day numbers;

d) time of the day based upon the 24-hour timekeeping system;

e) differences between local time and Coordinated Universal Time (UTC);

f) combination of date and time;

g) periods of time, with or without either a start or end date or both.

This International Standard is applicable whenever dates and times are included in information interchange.

This International Standard does not cover dates and times where words are used in the representation.

This International Standard does not assign any particular meaning or interpretation to any data element that uses representations in accordance with this International Standard. Such meaning will be determined by the context of the application.

2   References

ISO 31-0 : 1981, *General principles concerning quantities, units and symbols.*

ISO 31-1 : 1978, *Quantities and units of space and time.*

ISO 646 : 1983, *Information processing — ISO 7-bit coded character set for information interchange.*

3   Terms and definitions

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

3.1   complete representation: The representation that includes all the date and time elements associated with the expression.

3.2   Coordinated Universal Time (UTC): The time scale maintained by the Bureau International de l'Heure (International Time Bureau) that forms the basis of a coordinated dissemination of standard frequencies and time signals.

NOTES

1   The source of this definition is Recommendation 460-2 of the Consultative Committee on International Radio (CCIR). CCIR has also defined the acronym for Coordinated Universal Time as UTC (see also 5.3.3).

2   UTC is often (incorrectly) referred to as Greenwich Mean Time and appropriate time signals are regularly broadcast.

3.3   date, calendar: A particular day of a calendar year, identified by its ordinal number within a calendar month within that year.

3.4   date, ordinal: A particular day of a calendar year identified by its ordinal number within the year.

3.5   day: A period of time of 24 hours starting at 0000 and ending at 2400 (which is equal to the beginning of 0000 the next day).

3.6   format, basic: The format of a representation comprising the minimum number of components necessary for the precision required.

3.7   format, extended: An extension of the basic format that includes additional separators.

3.8   Gregorian calendar: A calendar in general use introduced in 1582 to correct an error in the Julian calendar. In the Gregorian calendar common years have 365 days and leap years 366 days divided into 12 sequential months.

3.9   hour: A period of time of 60 minutes.

3.10   local time: The clock time in public use locally.

3.11   minute: A period of time of 60 seconds.

3.12   month, calendar: A period of time resulting from the division of a calendar year in twelve sequential periods of time, each with a specific name and containing a specified number of days. In the Gregorian calendar, the months of the calendar year, listed in their order of occurrence, are named and contain the number of days as follows: January (31), February (28 in common years; 29 in leap years), March (31), April (30), May (31), June (30), July (31), August (31), September (30), October (31), November (30), December (31).

NOTE — In certain applications a month is regarded as a period of 30 days.

3.13   period: A duration of time, specified

   a)   as a defined length of time (e.g. hours, days, months, years);

   b)   by its beginning and end points.

3.14   second: A basic unit of measurement of time in the International System of Units (SI) as defined in ISO 31-1.

3.15   truncated representation: The abbreviation of a complete representation by omission of higher order components starting from the extreme left-hand side of the expression.

3.16   week: A period of time of seven days.

3.17   week, calendar: A seven day period within a calendar year, starting on a Monday and identified by its ordinal number within the year; the first calendar week of the year is the one that includes the first Thursday of that year. In the Gregorian calendar, this is equivalent to the week which includes 4 January.

3.18   year: A period of time of twelve consecutive months, considered to equal a calendar year.

3.19   year, calendar: A cyclic period of time in a calendar which is required for one revolution of the earth around the sun. In the Gregorian calendar, a calendar year is either a common year or a leap year.

3.20   year, common: In the Gregorian calendar, a year which has 365 days.

3.21   year, leap: In the Gregorian calendar, a year which has 366 days. A leap year is a year whose number is divisible by four an integral number of times, except that if it is a centennial year it shall be divisible by four hundred an integral number of times.

4 Fundamental principles

4.1 Concept

A precise point in calendar time can be identified by means of a unique expression giving a specific day and a specific time within that day. The degree of precision required for the application can be obtained by including the appropriate components.

4.2 Common features, uniqueness and combinations

The decreasing order of components, left-to-right, is common to the expressions for

— precise points in time;

— dates only;

— times only;

— periods of time;

— any abbreviations of the above.

4.3 Characters used in the representations

The representations specified in this International Standard use digits, alphabetic characters and special characters specified in ISO 646. The particular use of these characters is explained in 4.4 and clause 5.

NOTE — Where the upper case characters are not available lower case characters may be used.

The space character shall not be used in the representations.

4.4 Use of separators

When required, the following characters shall be used as separators:

[-] (hyphen) — to separate the time elements "year" and "month", "year" and "week", "year" and "day", "month" and "day", and "week" and "day";

NOTE — The hyphen is also used to indicate omitted components.

[:] (colon) — to separate the time elements "hour" and "minute", and "minute" and "second".

[/] (solidus) — to separate the two components in the representation of periods of time.

4.5 Truncation

It is permitted to omit higher order components (truncation) in applications where their presence is implied. To assure uniqueness of each representation provided for in this International Standard, truncation of a particular representation should be done in accordance with the rules given in the appropriate subclause of clause 5 referring to the representation

in question. The addition of a single hyphen in place of each omitted component will usually be necessary, to avoid risk of misinterpretation.

NOTE — By mutual agreement of the partners in information interchange, leading hyphens may be omitted in the applications where there is no risk of confusing these representations with others defined in this International Standard.

4.6 Leading zero(s)

Each date and time component in a defined representation has a defined length, and (a) leading zero(s) shall be used as required.

5 Representations

5.1 Explanations

5.1.1 Characters used in place of digits

[C] represents a digit used in the thousands and hundreds components (the "century" component) of the time element "year";

[Y] represents a digit used in the tens and units components of the time element "year";

[M] represents a digit used in the time element "month";

[D] represents a digit used in the time element "day";

[w] represents a digit used in the time element "week";

[h] represents a digit used in the time element "hour";

[m] represents a digit used in the time element "minute";

[s] represents a digit used in the time element "second";

[n] represents digit(s), constituting a positive integer.

5.1.2 Characters used as designators

[P] is used as period designator, preceding a data element which represents a given duration of a period of time;

[T] is used as time designator to indicate the start of the representation of the time of the day in combined date and time of day expressions;

[W] is used as week designator, preceding a data element which represents the ordinal number of a calendar week within the year;

[Z] is used as time-zone designator, immediately (without space) following a data element expressing the time of the day in Coordinated Universal Time (UTC).

In representations of duration of time (5.5.3.2), the following characters are also used as parts of the representation when required:

[Y]   [M]   [W]   [D]   [H]   [M]   [S]

NOTE — In these representations, [M] may be used to indicate "month" or "minute", or both.

3

5.2 Dates

For ease of comparison, in all the following examples of representations of dates, the date of 12 April 1985 is used as an illustration, as applicable.

5.2.1 Calendar date

In expressions of calendar dates

— **day of the month** (calendar day) is represented by two digits. The first day of any month is represented by [01] and subsequent days of the same month are numbered in ascending sequence;

— **month** is represented by two digits. January is represented by [01], and subsequent months are numbered in ascending sequence;

— **year** is generally represented by four digits; years are numbered in ascending order according to the Gregorian Calendar.

5.2.1.1 Complete representation

When the application clearly identifies the need for an expression only of a calendar date, then the complete representation shall be a single numeric data element comprising eight digits, where [CCYY] represents a calendar year, [MM] the ordinal number of a calendar month within the calendar year, and [DD] the ordinal number of a day within the calendar month.

Basic format: CCYYMMDD

Example: 19850412

Extended format: CCYY-MM-DD

Example: 1985-04-12

5.2.1.2 Representations with reduced precision

If in a given application it is sufficient to express a calendar date with less precision than a complete representation as specified in 5.2.1.1, either two, four or six digits may be omitted, the omission starting from the extreme right-hand side. The resulting representation will then indicate a month, a year or a century, as set out below. When only [DD] are omitted, a separator shall be inserted between [CCYY] and [MM], but separators shall not be used in the other representations with reduced precision.

a) A specific month

Basic format: CCYY-MM

Example: 1985-04

Extended format: not applicable

b) A specific year

Basic format: CCYY

Example: 1985

Extended format: not applicable

c) A specific century

Basic format: CC

Example: 19

Extended format: not applicable

5.2.1.3 Truncated representations

If truncated representations are required the basic formats shall be as specified below. In each case hyphens (to indicate omitted components) shall be used only as indicated.

a) A specific date in the current century

Basic format: YYMMDD

Example: 850412

Extended format: YY-MM-DD

Example: 85-04-12

b) A specific year and month in the current century

Basic format: -YYMM

Example: -8504

Extended format: -YY-MM

Example: -85-04

c) A specific year in the current century

Basic format: -YY

Example: -85

Extended format: not applicable

d) A specific day of a month

Basic format: --MMDD

Example: --0412

Extended format: --MM-DD

Example: --04-12

e) A specific month

Basic format: --MM

Example: --04

Extended format: not applicable

f) A specific day

Basic format: ---DD

Example: ---12

Extended format: not applicable

5.2.2 Ordinal date

The ordinal day of the year is represented by three decimal digits. The first day of any year is represented by [001] and subsequent days are numbered in ascending sequence.

5.2.2.1 Complete representation

When the application clearly identifies the need for a complete representation of an ordinal date, it shall be one of the numeric

expressions as follows, where [CCYY] represents a calendar year and [DDD] the ordinal number of a day within the year.

Basic format: CCYYDDD

Example: 1985102

Extended format: CCYY-DDD

Example: 1985-102

5.2.2.2 Truncated representations

If truncated representations are required, the basic formats shall be as specified below. In each case hyphens (to indicate omitted components) shall be used only as indicated.

a) A specific year and day in the current century

Basic format: YYDDD

Example: 85102

Extended format: YY-DDD

Example: 85-102

b) Day only

Basic format: -DDD

Example: -102

Extended format: not applicable

NOTE — Logically, the representation should be [--DDD], but the first hyphen is superfluous and, therefore, it has been omitted.

5.2.3 Date identified by calendar week and day numbers

Calendar week is represented by two numeric digits. The first calendar week of a year shall be identified as [01] and subsequent weeks shall be numbered in ascending sequence.

Day of the week is represented by one decimal digit. Monday shall be identified as day [1] of any calendar week, and subsequent days of the same week shall be numbered in ascending sequence to Sunday (day [7]).

5.2.3.1 Complete representation

When the application clearly identifies the need for a complete representation of a date identified by calendar week and day numbers, it shall be one of the alphanumeric expressions as follows, where [CCYY] represents a calendar year, [W] is the week designator, [ww] represents the ordinal number of a calendar week within the year, and [D] represents the ordinal number of a day within the calendar week.

Basic format: CCYYWwwD

Example: 1985W155

Extended format: CCYY-Www-D

Example: 1985-W15-5

5.2.3.2 Representation with reduced precision

If the degree of precision required permits, one digit may be omitted from the representation in 5.2.3.1.

Basic format: CCYYWww

Example: 1985W15

Extended format: CCYY-Www

Example: 1985-W15

5.2.3.3 Truncated representations

If truncated representations are required the basic formats shall be as specified below. In each case hyphens (to indicate omitted components) shall be used only as indicated.

a) Year, week and day in the current century

Basic format: YYWwwD

Example: 85W155

Extended format: YY-Www-D

Example: 85-W15-5

b) Year and week only in the current century

Basic format: YYWww

Example: 85W15

Extended format: YY-Www

Example: 85-W15

c) Year of the current decade, week and day only

Basic format: -YWwwD

Example: -5W155

Extended format: -Y-Www-D

Example: -5-W15-5

d) Week and day only of the current year

Basic format: -WwwD

Example: -W155

Extended format: -Www-D

Example: -W15-5

e) Week only of the current year

Basic format: -Www

Example: -W15

Extended format: not applicable

f) Day only of the current week

Basic format: -W-D

Example: -W-5

Extended format: not applicable

NOTE — Although the representation [-W-D] could be abbreviated to [-D] without risk of misinterpretation, the full, logical, derivation

has been retained because the [W] serves to identify the representation as a date based on week and day numbers. Its frequency of use is expected to be low and, therefore, the two potentially superfluous characters are not likely to create transmission problems.

g) Day only of any week

Basic format: ---D

Example: ---5

Extended format: not applicable

5.3 Time of the day

As this International Standard is based on the 24-hour timekeeping system which is now in common use, hours are represented by two digits from [01] to [24], whereas minutes and seconds are represented by two digits from [01] to [60]. For most purposes times will be represented by four digits [hhmm].

5.3.1 Local time of the day

5.3.1.1 Complete representation

When the application clearly identifies the need for an expression only of a time of the day then the complete representation shall be a single numeric data element comprising six digits in the basic format, where [hh] represents hours, [mm] minutes and [ss] seconds.

Basic format: hhmmss

Example: 232050

Extended format: hh:mm:ss

Example: 23:20:50

5.3.1.2 Representations with reduced precision

If the degree of precision required permits, either two or four digits may be omitted from the representation in 5.3.1.1.

Basic format: hhmm
        hh

Example: 2320
        23

Extended format: hh:mm
        not applicable

Example: 23:20

5.3.1.3 Representation of decimal fractions

If necessary for a particular application a decimal fraction of hour, minute or second may be included. If a decimal fraction is included, lower order components (if any) shall be omitted, and the decimal fraction shall be divided from the integer part by the decimal sign specified in ISO 31-0: i.e. the comma [,] or full stop [.]. Of these, the comma is the preferred sign. If the magnitude of the number is less than unity, the decimal sign shall be preceded by a zero (see ISO 31-0).

The number of digits in the decimal fraction shall be determined by the interchange parties, dependent upon the application. The format shall be [hhmmss,s], [hhmm,m] or [hh,h] as appropriate (hour minute second, hour minute and hour, respectively), with as many digits as necessary following the decimal sign. If the extended format is required, separators may be included in the decimal representation when the complete representation is used, or when it is reduced by omission of [ss,s].

Basic format: hhmmss,s
        hhmm,m
        hh,h

Example: 232050,5
        2320,9
        23,3

Extended format: hh:mm:ss,s
        hh:mm,m
        not applicable

Example: 23:20:50,5
        23:20,9

5.3.1.4 Truncated representations

If truncated representations are required the basic formats shall be as specified below. In each case hyphens (to indicate omitted components) shall be used only as indicated.

a) A specific minute and second of the hour

Basic format: -mmss

Example: -2050

Extended format: -mm:ss

Example: -20:50

b) A specific minute of the hour

Basic format: -mm

Example: -20

Extended format: not applicable

c) A specific second of the minute

Basic format: --ss

Example: --50

Extended format: not applicable

d) A specific hour of the day and decimal fraction of the hour

Basic format: hh,h

Example: 11,3

Extended format: not applicable

e) A specific minute of the hour and a decimal fraction of the minute

Basic format: -mm,m

Example: -20,9

Extended format: not applicable

f)   A specific minute and second of the hour and a decimal fraction of the second

Basic format: -mmss,s

Example: -2050,5

Extended format: -mm:ss,s

Example: -20:50,5

g)   A specific second of the minute and a decimal fraction of the second

Basic format: --ss,s

Example: --50,5

Extended format: not applicable

NOTE — The basic formats above show only one digit following the decimal sign, but as many digits as required may be used.

5.3.2   Midnight

The complete and extended representations for midnight, in accordance with 5.3.1, shall be expressed in either of the two following ways:

Basic format		Extended format
a)	000000	00:00:00 (the beginning of a day);
b)	240000	24:00:00 (the end of a day).

The representations may be reduced in accordance with 5.3.1.4.

NOTES

1   Midnight will normally be represented as [0000] or [2400].

2   The choice of representation a) or b) will depend upon any association with a date, or a time period.

3   The end of one day (2400) coincides with [0000] at the start of the next day, e.g. 2400 on 12 April 1985 is the same as 0000 on 13 April 1985. If there is no association with a date or a time period both a) and b) represent the same clock time in the 24-hour timekeeping system.

5.3.3   Coordinated Universal Time (UTC)

To express the time of the day in Coordinated Universal Time, the representations specified in 5.3.1 shall be used, followed immediately, without spaces, by the time-zone designator [Z]. The examples below are complete and reduced precision representations of the UTC time 20 minutes and 30 seconds past 23 hours:

Basic format: hhmmssZ
hhmmZ
hhZ

Example: 232030Z
2320Z
23Z

Extended format: hh:mm:ssZ
hh:mmZ
not applicable

Example: 23:20:30Z
23:20Z

5.3.3.1   Differences between local time and Coordinated Universal Time

When it is required to indicate the difference between local time and Coordinated Universal Time, its representation shall be appended to the representation of the local time following immediately, without space, the lowest order (extreme right-hand) component of the local time expression, which, in this case, shall always include hours.

The difference between local time and Coordinated Universal Time shall be expressed in hours and minutes, or hours only independently of the precision of the local time expression associated with it. It shall be expressed as positive (i.e. with the leading plus sign [+]) if the local time is ahead of and as negative (i.e. with the leading minus sign [−]) if it is behind Coordinated Universal Time as shown below. The complete representation of the time of 27 minutes 46 seconds past 15 hours locally in Geneva (normally one hour ahead of UTC), and in New York (five hours behind UTC), together with the indication of the difference between the local time and Coordinated Universal Time, are used as examples.

Basic format: + hhmm
+ hh
− hhmm
− hh

Example: 152746 + 0100
152746 + 01
152746 − 0500
152746 − 05

Extended format: + hh:mm
not applicable
− hh:mm
not applicable

Example: 15:27:46 + 01:00
15:27:46 + 01
15:27:46 − 05:00
15:27:46 − 05

NOTE — The representations of the negative difference between local time and Coordinated Universal Time should not be used alone as they may be confused with the truncated representations of dates provided for in 5.2.1.3, and with truncated representations of time of the day provided for in 5.3.1.4.

5.4   Combinations of date and time of the day representations

When the application does not clearly identify the need for only a date expression (see 5.2) or only a time of the day expression (see 5.3), then a moment of time can be identified through a combination of date and time of the day representations provided for in this International Standard.

5.4.1   Complete representation

The components of an instant of time shall be written in the following sequence:

a)   For calendar dates:

year - month - day - time designator - hour - minute - second

b)   For ordinal dates:

   year - day - time designator - hour - minute - second

c)   For dates identified by week and day numbers:

   year - week designator - week - day - time designator - hour - minute - second

The character [T] shall be used as time designator to indicate the start of the representation of date time of day in combined date and time of day expressions. The hyphen [-] and the colon [:] shall be used, in accordance with 4.4, as separators within the date and time of the day expressions respectively, when required. When any of the date or time components are omitted, the time designator shall always precede the remaining time of day components.

NOTE — By mutual agreement of the partners in information interchange, the character [T] may be omitted in applications where there is no risk of confusing a combined date and time of the day representation with others defined in this International Standard.

The following are examples of complete and reduced representation (in basic and extended format) of combinations of date and time of the day representations:

a)   Calendar date and local time of the day

Basic format: CCYYMMDDThhmmss
CCYYMMDDThhmm
CCYYMMDDThh

Examples: 19850412T101530
19850412T1015
19850412T10

Extended format: CCYY-MM-DDThh:mm:ss
CCYY-MM-DDThh:mm
CCYY-MM-DDThh

Examples: 1985-04-12T10:30
1985-04-12T10:15
1985-04-12T10

b)   Ordinal date and local time of the day

Basic format: CCYYDDDThhmmss
CCYYDDDThhmm
CCYYDDDThh

Examples: 1985102T235030
1985102T2350
1985102T23

Extended format: CCYY-DDDThh:mm:ss
CCYY-DDDThh:mm
CCYY-DDDThh

Examples: 1985-102T23:50:30
1985-102T23:50
1985-102T23

c)   Date identified by calendar week and day numbers and local time of the day

Basic format: CCYYWwwDThhmmss
CCYYWwwDThhmm
CCYYWwwDThh

Examples: 1985W155T235030
1985W155T2350
1985W155T23

Extended format: CCYY-Www-DThh:mm:ss
CCYY-Www-DThh:mm
CCYY-Www-DThh

Examples: 1985-W15-5T23:30
1985-W15-5T23:50
1985-W15-5T23

5.4.2   Representations other than complete

For reduced precision or truncated representations of a combined date and time expression any of the representations in 5.2.1 (for calendar dates), 5.2.2 (for ordinal dates) or 5.2.3 (for dates identified by week numbers) may be combined with any of the representations in 5.3 provided that the rules specified in those sections are applied, together with the following:

a)   the date component shall not be represented with reduced precision and the time component shall not be truncated in a combined date and time expression;

b)   when truncation occurs in the date component of a combined date and time expression, it is not necessary to replace the omitted higher order components with the hyphen [-];

c)   when the context does not clearly identify a time only component, and if the extended format including colon [:] separator is not used, then it is necessary to commence the time expression with the designator [T].

5.5   Periods of time

5.5.1   Means of specifying periods

A period of time shall be expressed in one of the following ways:

a)   As a duration of time delimited by a specific start and a specific end;

b)   As a quantity of time expressed in one or more specific components but not associated with any specific start or end;

c)   As a quantity of time associated with a specific start;

d)   As a quantity of time associated with a specific end.

5.5.2   Separators and designators

A solidus [/] shall be used to separate the two components in each of 5.5.1 a), c) and d).

For 5.5.1 b), c) and d) the designator [P] shall precede, without spaces, the representation of the duration.

Other designators (and the hyphen when used to indicate omitted components) shall be used as shown in 5.5.3 below.

NOTE — In certain application areas a double hyphen is used as a separator instead of a solidus.

5.5.3   Complete representations

5.5.3.1   Representation of period identified by its start and end

When the application clearly identifies the need for a complete representation of a period of time, identified by its start and its end, it shall be one of the alphanumeric expressions as set out below. For the specific start or end of a period, [CCYY] represents a calendar year, [MM] the ordinal number of a calendar month within the calendar year, [DD] the ordinal number of a day within the calendar month, [hh] hours, [mm] minutes and [ss] seconds.

Basic format:
CCYYMMDDThhmmss/CCYYMMDDThhmmss

> *Example:* 19850412T232050/19850625T103000
>
> A period beginning at 20 minutes and 50 seconds past 23 hours on 12 April 1985 and ending at 30 minutes past 10 hours on 25 June 1985.

5.5.3.2 Representation of duration of time

A given duration of a period of time, whether or not associated with a start or end, shall be represented by a data element of variable length, preceded by the designator [P]. The number of years shall be followed by the designator [Y], the number of months by [M], the number of weeks by [W], and the number of days by [D]. The part including time components shall be preceded by the designator [T]; the number of hours shall be followed by [H], the number of minutes by [M] and the number of seconds by [S]. In the example set out below, [n] represents one or more digits, constituting a positive integer.

> *Basic format:* PnYnMnDTnHnMnS
>
> PnW
>
> *Example:* P2Y10M15DT10H30M20S
>
> A duration of two years, 10 months, 15 days, 10 hours, 30 minutes and 20 seconds.
>
> P6W
>
> A period of six weeks.

5.5.3.2.1 Alternative format

If required for particular reasons, durations of time may be expressed in conformity with the format used for points-in-time, as specified in clause 5. Accordingly, the values expressed must not exceed the "carry-over points" of 12 months, 30 days, 24 hours, 60 minutes and 60 seconds. Since weeks have no defined carry-over point (52 or 53), weeks should not be used in these applications.

5.5.3.3 Representation of period identified by its start and its duration

Basic format:
CCYYMMDDThhmmss/PnYnMnDTnHnMnS

> *Example:* 19850412T232050/P1Y2M15DT12H30M
>
> A period of one year, 2 months, 15 days, 12 and a half hours, beginning on 12 April 1985 at 20 minutes and 50 seconds past 23 hours.

5.5.3.4 Representation of period identified by its duration and its end

Basic format:
PnYnMnDTnHnMnS/CCYYMMDDThhmmss

> *Example:* P1Y2M15DT12H30M/19850412T232050
>
> A period of one year, 2 months, 15 days and 12 and a half hours, ending on 12 April 1985 at 20 minutes and 50 seconds past 23 hours.

NOTES

1 Where complete representations using calendar dates have been shown, ordinal dates (5.2.2) or dates identified by week number (5.2.3) may be substituted in similar fashion.

2 In 5.5.3.2, 5.5.3.3 and 5.5.3.4 the components for duration would frequently be in reduced precision form.

If extended formats are required, they shall conform to the requirements of 5.2.1.1, 5.2.2.1, 5.2.3.1 and 5.3.1.1.

5.5.4 Representations other than complete

If reduced precision, or truncated, or decimal representations, or extended formats, are used in place of any components in the complete representations, they shall each be in accordance with the corresponding rules in 5.2 and 5.3.

In representation for the periods in 5.5.1 a),

— if higher order components are omitted from the expression following the solidus (i.e. the representation for "end of period"), it shall be assumed that the corresponding components from the "start of period" expression apply (e.g. if [CCYYMM] are omitted by using a derived representation, the end of the period is in the same year and month as the start of the period);

— representations for time-zones and Coordinated Universal Time included with the component preceding the solidus shall be assumed to apply to the component following the solidus, unless a corresponding alternative is included.

Annex A

Relationship to ISO 2014, 2015, 2711, 3307 and 4031

(This annex does not form part of the standard.)

A.1   In preparing the first edition of ISO 2014 an examination was carried out of the potential uses of all-numeric dates. The advantages of the descending order year-month-day were found to outweigh those for the ascending order day-month-year already established at that time in many parts of the world.

The advantages of the descending order were found to include the following, in particular:

a)   the avoidance of confusion in comparison with existing national conventions using different systems of ascending order;

b)   the ease with which the whole date may be treated as a single numeral for the purposes of filing and classification;

c)   arithmetic calculation, particularly in some computer uses;

d)   the possibility of continuing the order by adding digits for hour-minute-second.

A.2   For times, use of the 24-hour timekeeping system is now so common (particularly in view of the wide availability and use of digital watches) that separators to aid human interpretation are no longer necessary but are included as options.

The natural addition of the lower order time digits to the higher order date digits (see above) established the basic concept used in the preparation of this International Standard: that a point in time could be uniquely represented in all-numeric form by a string of digits commencing with year and ending with hour, minute or second, depending on the precision desired.

From that concept representations of all other date and time values were logically derived and, thus, ISO 2014, ISO 3307 and ISO 4031 have been superseded.

A.3   Numbering of days and weeks in the year based on the Gregorian calendar is important in many commercial applications. Methods of numbering the weeks of the year vary from country to country, and, therefore, for international trade and for industrial planning within international companies it is essential to use uniform numbering of weeks. ISO 2015 and ISO 2711 were prepared to meet these requirements.

The uniform numbering of weeks necessitates a unique designation of the day on which a week begins. For commercial purposes, i.e. accounting, planning and similar purposes for which a week number might be used, Monday has been found the most appropriate as the first day of the week.

Identification of a particular date by means of ordinal dates (ISO 2711) and by means of the week numbering system (ISO 2015) were alternative methods that the basic concept of this International Standard could also encompass and, thus, ISO 2015 and ISO 2711 have now been superseded.

Annex B

Examples of representation of dates, time of the day, combinations of date and time, and periods of time

(This annex does not form part of the standard.)

B.1 Dates

Basic format	Extended format	Explanations
Calendar date — 12 April 1985		
19850412	1985-04-12	Complete
850412	85-04-12	Year of any century, with month and date only
--0412	--04-12	Month and date of any year
---12	not applicable	Day only of any month
Ordinal date — 12 April 1985		
1985102	1985-102	Complete
85102	85-102	Year of any century, with ordinal day
5-102	not applicable	Year of any decennium, with ordinal day
-102	not applicable	Ordinal day of any year
Calendar week and day — Friday 12 April 1985		
1985W155	1985-W15-5	Complete
85W155	85-W15-5	Year of any century, with week and day
-5W155	-5-W15-5	Year of any decennium, with week and day
-W155	-W15-5	Week and day of any year
-W-5	not applicable	Any week and day of that week
Calendar week — 15th week of 1985		
1985W15	1985-W15	Complete
85W15	85-W15	Year of any century and week of that year
-5W15	-5-W15	Year of any decennium and week of that year
-W15	not applicable	Specific week of any year
Day of the week — Friday		
---5	not applicable	Any Friday
Calendar month — April 1985		
1985-04	not applicable	Complete
-8504	-85-04	Year of any century and month of that year
--04	not applicable	Specific month of any year
Calendar year — 1985		
1985	not applicable	Complete
-85	not applicable	Specific year of any century

B.2   Time of the day

Basic format	Extended format	Explanations

Local time of the day

27 minutes 46 seconds past 15 hours locally

152746	15:27:46	Complete
-2746	-27:46	Specific minute and second of any hour
--46	not applicable	Specific second of any minute

Reduced to hours and minutes

1527	15:27	Complete
-27	not applicable	Specific minute of any hour

Reduced to hours

15	not applicable	Specific hour of any day

Local time with decimal fractions

27 minutes 35 and a half seconds past 15 hours locally

152735,5	15:27:35,5	Complete
-2735,5	-27:35,5	Minute of hour, second with decimal fraction
--35,5	not applicable	Second with decimal fraction of the minute
15,46	not applicable	Hour with decimal fraction of that hour
-27,59	not applicable	Minute with decimal fraction of that minute
-,59	not applicable	Decimal fraction of the minute
--,5	not applicable	Decimal fraction of the second

Midnight — The beginning of a day

000000	00:00:00	Complete
0000	00:00	Hour and minute only

Midnight — The end of the day

240000	24:00:00	Complete
2400	24:00	Hour and minute only

Coordinated Universal Time (UTC)

20 minutes and 30 seconds past 23 hours UTC

232030Z	23:20:30Z	Complete
2320Z	23:20Z	Hour and minute in UTC
23Z	not applicable	Hour in UTC

Differences between local time and Coordinated Universal Time

The time of 27 minutes 46 seconds past 15 hours locally in Geneva (one hour ahead of UTC)

152746 + 0100	15:27:46 + 01:00	Complete
152746 + 01	15:27:46 + 01	Time difference expressed in hours only

The same time locally in New York (five hours behind UTC)

152746-0500	15:27:46-05:00	Complete
152746-05	15:27:46-05	Time difference expressed in hours only