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Data elements and interchange formats — Information interchange - Representation of dates and times — Part 1: Basic rules

DIS stage

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 154, *Processes, data elements and documents in commerce, industry and administration*.

This fourth edition cancels and replaces the third edition (ISO 8601:2004), which has been technically revised with the following changes:

— Conversion of the content as Part 1 with the part title "Basic rules" due to the addition of another Part 2 "Extensions" of ISO 8601;

— Elimination of the term "midnight" and changes to the use of the value '24' for hour. This is in response to requests from the Information Technology user communities to (1) remove ambiguities caused by the term "midnight", which has been replaced by "Beginning of day" and "End of day"; and (2) align the representation of the beginning/end of day with current de facto industry practice;

— Change of the representation of leap seconds (2.2.2); and

— Amendment of the recurring time interval (2.1.17 and 4.5) to provide a link to Part 2 which contains in section 5 the 'Repeat Rules for Recurring Time Intervals'.

ISO 8601 consists of the following part, under the generic title *Data elements and interchange formats — Information interchange - Representation of dates and times*:

— Part 1: Basic rules

— Part 2: Extensions

Introduction

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.

This International Standard includes specifications for a numeric representation of information regarding date and time of day. In addition this International Standard includes specifications for representation of the formats of these numeric representations.

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

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.

This International Standard retains the most commonly used expressions for date and time of 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.

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. Note that for units of time in plain text the symbols given in ISO 31-1 should be used.

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.

Data elements and interchange formats — Information interchange - Representation of dates and times — Part 1: Basic rules

1 Scope

This International Standard is applicable whenever representation of dates in the Gregorian calendar, times in the 24-hour timekeeping system, time intervals and recurring time intervals or of the formats of these representations are included in information interchange. It includes

— calendar dates expressed in terms of calendar year, calendar month and calendar day of the month;

— ordinal dates expressed in terms of calendar year and calendar day of the year;

— week dates expressed in terms of calendar year, calendar week number and calendar day of the week;

— local time based upon the 24-hour timekeeping system;

— Coordinated Universal Time of day;

— local time and the difference from Coordinated Universal Time;

— combination of date and time of day;

— time intervals;

— recurring time intervals.

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

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

2.1 Basic concepts

2.1.1
time axis
mathematical representation of the succession in time of instantaneous events along a unique axis

[IEC 60050-111]

2.1.2
instant
point on the time axis

[IEC 60050-111]

Note to entry: An instantaneous event occurs at a specific instant.

2.1.3
time interval
part of the time axis limited by two instants

[IEC 60050-111]

Note to entry: A time interval comprises all instants between the two limiting instants and, unless otherwise stated, the limiting instants themselves.

2.1.4
time scale
system of ordered marks which can be attributed to instants on the time axis, one instant being chosen as the origin

[IEC 60050-111]

Note 1 to entry: A time scale may amongst others be chosen as:
— continuous, e.g. international atomic time (TAI) (see IEC 60050-713, item 713-05-18);
— continuous with discontinuities, e.g. Coordinated Universal Time (UTC) due to leap seconds, standard time due to summer time and winter time;
— successive steps, e.g. usual calendars, where the time axis is split up into a succession of consecutive time intervals and the same mark is attributed to all instants of each time interval;
— discrete, e.g. in digital techniques.

Note 2 to entry: For physical and technical applications, a time scale with quantitative marks is preferred, based on a chosen initial instant together with a unit of measurement.

Note 3 to entry: Customary time scales use various units of measurement in combination, such as second, minute, hour, or various time intervals of the calendar such as calendar day, calendar month and calendar year.

Note 4 to entry: A time scale has a reference point which attributes one of the marks of the time scale to one of the instants, thus determining the attribution of marks to instants for the time scale.

2.1.5
time point
date
time
mark attributed to an instant by means of a specified time scale

[IEC 60050-111]

Note 1 to entry: On a time scale consisting of successive steps, two distinct instants may be expressed by the same time point (see Note 1 of the term “time scale”).

Note 2 to entry: For many time scales with quantitative marks, the numerical value of the time point of an instant may also be considered to be equal to the duration between the origin of the time scale and the considered instant.

Note 3 to entry: In IEC 60050-111 this definition corresponds with the term “date”.

Note 4 to entry: The term “time” is often used in common language. However, it should only be used if the meaning is clearly visible from the context, since the term “time” is also used with other meanings.

2.1.6
duration
non-negative quantity attributed to a time interval, the value of which is equal to the difference between the time points of the final instant and the initial instant of the time interval, when the time points are quantitative marks

[IEC 60050-111]

Note 1 to entry: In the case of discontinuities in the time scale, such as a leap second or the change from winter time to summer time and back, the computation of the duration requires the subtraction or addition of the change of duration of the discontinuity.

Note 2 to entry: Duration is one of the base quantities in the International System of Quantities (ISQ) on which the International System of Units (SI) is based. The term "time" instead of "duration" is often used in this context.

Note 3 to entry: For the term "duration", expressions such as "time" or "time interval" are often used. The term "time" is not recommended in this sense and the term "time interval" is deprecated in this sense to avoid confusion with the concept "time interval".

Note 4 to entry: The SI unit of duration is the second.

2.1.7
nominal duration
duration expressed amongst others in years, months, weeks or days

Note to entry: The duration of a calendar year, a calendar month, a calendar week or a calendar day depends on its position in the calendar. Therefore, the exact duration of a nominal duration can only be evaluated if the duration of the calendar years, calendar months, calendar weeks or calendar days used are known.

2.1.8
date
time point representing a calendar day on a time scale consisting of an origin and a succession of calendar days

Note to entry: In IEC 60050-111 this definition corresponds with the term "calendar date".

2.1.9
calendar date
date representing a particular calendar day by its calendar year, its calendar month and its ordinal number within its calendar month

2.1.10
ordinal date
date representing a particular calendar day by its calendar year and its ordinal number within its calendar year

2.1.11
week date
date representing a particular calendar day by the calendar year to which its calendar week belongs, the ordinal number of its calendar week within that calendar year and its ordinal number within its calendar week

2.1.12
Coordinated Universal Time
UTC
time-scale maintained by the International Bureau of Weights and Measures (BIPM), with assistance from the International Earth Rotation Service (IERS), which forms the basis of a coordinated dissemination of standard frequencies and time signals

[ITU-R TF.460-6]

Note 1 to entry: UTC is the time standard commonly used across the world. It is the time of day at longitude zero degrees, the prime meridian (the meridian that runs through Greenwich, England, considered the official prime

meridian). The world's timing centers have agreed to keep their time scales synchronized (or coordinated – hence the name Coordinated Universal Time). UTC is expressed independent of local time. Thus entities unaware of local time (airplanes for instance) may use UTC to communicate time of day.

Note 2 to entry: In order to indicate that a time is measured in Universal Time (UTC), the capital letter Z is added to end of the time. 'The resulting string (time with Z appended) is referred to as "current UTC time" or "UTC time of day". The Z stands for the "zero meridian" and it is also commonly used in radio communication where it is pronounced "Zulu" (the word for Z in the international radio alphabet). Universal Time is sometimes also called "Zulu Time".

Note 3 to entry: UTC is not a time zone, it is a standard. UTC is also not GMT (Greenwich Mean Time), rather, UTC has replaced GMT. UTC is more precise; the term 'GMT' is ambiguous.

2.1.13
UTC of day
current UTC time

2.1.14
standard time
time scale derived from coordinated universal time, UTC, by a time shift established in a given location by the competent authority

[IEC 60050-111]

Note to entry: This time shift may be varied in the course of a year.

2.1.15
standard time of day
quantitative expression marking an instant within a calendar day by the duration elapsed after the beginning of the day in the local standard time

[IEC 60050-111] --> due to the changed definition the reference needs to be deleted!

Note to entry: Standard time of day is called "clock time" in IEC 60050-111.

2.1.16
local time
locally applicable time of day such as standard time of day, or a non-UTC based time of day

2.1.17
recurring time interval
series of consecutive time intervals of the same duration or nominal duration

Note 1 to entry: If the duration of the time intervals is measured in calendar entities, the duration of each time interval depends on the calendar dates of its start and its end.

Note 2 to entry: If the time interval is repeating to a set of rules, section 5 – "Repeat Rules for Recurring Time Intervals", of ISO 8601 Part to shall be applied.

2.2 Time units, nominal durations and time intervals

2.2.1
second
base unit of measurement of time in the International System of Units (SI) as defined by the International Committee of Weights and Measures (CIPM, i.e. Comité International des Poids et Mesures)

Note 1 to entry: See also ISO 31-1.

Note 2 to entry: It is the base unit for expressing duration.

2.2.2
leap second
intentional time step of one second to adjust UTC to ensure appropriate agreement with UT1, a time scale based on the rotation of the Earth

[Rec. ITU-R TF.460-5]

Note to entry: An inserted second is called positive leap second and an omitted second is called negative leap second. A positive leap second is inserted after [23:59:59Z] and can be represented as [23:59:60Z]. Negative leap second is achieved by the omission of [23:59:59Z]. Insertion or omission takes place as determined by IERS, normally on 30 June or 31 December, but if necessary on 31 March or 30 September.

2.2.3
minute
unit of time, equal to 60 seconds

[ISO 31-1]

2.2.4
hour
unit of time, equal to 60 minutes

[ISO 31-1]

2.2.5
day
〈unit of time〉 unit of time, equal to 24 hours

[ISO 31-1]

2.2.6
calendar day
time interval starting at the beginning of the day and ending with the beginning of the next day, the latter being the starting instant of the next calendar day

Note 1 to entry: A calendar day is often also referred to as day.

Note 2 to entry: The duration of a calendar day is 24 hours; except if modified by:
— the insertion or deletion of leap seconds, by decision of the International Earth Rotation Service (IERS), or
— the insertion or deletion of other time intervals, as may be prescribed by local authorities to alter the time scale of local time.

2.2.7
day
〈duration〉 duration of a calendar day

Note to entry: The term “day” applies also to the duration of any time interval which starts at a certain time of day at a certain calendar day and ends at the same time of day at the next calendar day.

2.2.8
calendar week
time interval of seven calendar days starting with a Monday

Note 1 to entry: A calendar week is often also referred to as week.

Note 2 to entry: See 3.2.2 for the names of the calendar days and their day numbers.

Note 3 to entry: A calendar week may be identified by its ordinal number within its calendar year.

2.2.9
week
duration of a calendar week

Note to entry: The term "week" applies also to the duration of any time interval which starts at a certain time of day at a certain calendar day and ends at the same time of day at the same calendar day of the next calendar week.

2.2.10
calendar week number
ordinal number which identifies a calendar week within its calendar year according to the rule that the first calendar week of a year is that one which includes the first Thursday of that year and that the last calendar week of a calendar year is the week immediately preceding the first calendar week of the next calendar year

2.2.11
calendar month
time interval resulting from the division of a calendar year in 12 time intervals, each with a specific name and containing a specific number of calendar days

Note 1 to entry: A calendar month is often referred to as month.

Note 2 to entry: See 3.2.1 for the names of the months of the calendar year in the Gregorian calendar, listed in their order of occurrence, for their number of days, and for the ordinal dates of the days in common and leap years.

2.2.12
month
duration of 28, 29, 30 or 31 calendar days depending on the start and/or the end of the corresponding time interval within the specific calendar month

Note 1 to entry: The term "month" applies also to the duration of any time interval which starts at a certain time of day at a certain calendar day of the calendar month and ends at the same time of day at the same calendar day of the next calendar month, if it exists. In other cases the ending calendar day has to be agreed on.

Note 2 to entry: In certain applications a month is considered as a duration of 30 calendar days.

2.2.13
calendar year
cyclic time interval in a calendar which is required for one revolution of the Earth around the Sun and approximated to an integral number of calendar days

Note 1 to entry: A calendar year is often also referred to as year.

Note 2 to entry: Unless otherwise specified the term designates in this International Standard a calendar year in the Gregorian calendar.

2.2.14
year
duration of 365 or 366 calendar days depending on the start and/or the end of the corresponding time interval within the specific calendar year

Note to entry: The term “year” applies also to the duration of any time interval which starts at a certain time of day at a certain calendar date of the calendar year and ends at the same time of day at the same calendar date of the next calendar year, if it exists. In other cases the ending calendar date has to be agreed on.

2.2.15
Gregorian calendar
calendar in general use, introduced in 1582 to define a calendar year that more closely approximated the tropical year than the Julian calendar

Note to entry: In this International Standard the term Gregorian calendar is used to refer to the time scale described in 3.2.1.

2.2.16
common year
calendar year in the Gregorian calendar that has 365 calendar days

2.2.17
leap year
calendar year in the Gregorian calendar that has 366 calendar days

2.2.18
centennial year
calendar year in the Gregorian calendar whose year number is divisible without remainder by hundred

2.3 Representations and formats

2.3.1
date and time representation
expression indicating a time point, time interval or recurring time interval

2.3.2
date and time format representation
expression describing the format of a group of date and time representations

2.3.3
basic format
format of a date and time representation or date and time format representation comprising the minimum number of time elements necessary for the precision required

Note to entry: The basic format should be avoided in plain text.

2.3.4
extended format
extension of the basic format that includes additional separators

2.3.5
complete representation
representation that includes all the date and time components associated with the expression; limited, if applicable, for time elements of representations expressing a calendar year to four digits

2.3.6
decimal representation
expansion of a representation by addition of a decimal fraction to the lowest order component of the expression

2.3.7
representation with reduced precision
abbreviation of a representation by omission of lower order components

2.3.8
expanded representation
expansion of a representation to allow identification of dates in calendar years outside the range [0000] till [9999]

3 Fundamental principles

3.1 Basic rules

This International Standard gives a set of rules for the representation of

— time points,

— time intervals,

— recurring time intervals.

Both accurate and approximate representations can be identified by means of unique and unambiguous expressions specifying the relevant dates, times of day and durations. The degree of precision required and obtainable can be varied by including or deleting the appropriate time elements (such as seconds).

In addition, this International Standard gives rules for the representation of expressions describing the format of the above representations.

The decreasing order of time elements, left-to-right, is common to these representations.

3.2 Time scales

3.2.1 The Gregorian calendar

This International Standard uses the Gregorian calendar for the identification of calendar days. This calendar provides a time scale consisting of a, potentially infinite, series of contiguous calendar years. Consecutive calendar years are identified by sequentially assigned year numbers.

The Gregorian calendar distinguishes common years of 365 consecutive calendar days and leap years of 366 consecutive calendar days. A leap year is a year whose year number is divisible by four an integral number of times. However, a centennial year is not a leap year unless its year number is divisible by four hundred an integral number of times.

In the Gregorian calendar each calendar year is divided in 12 sequential calendar months, each consisting of a specific number of calendar days as indicated in Table 1.

The Gregorian calendar has a reference point that assigns 20 May 1875 to the calendar day that the “Convention du Mètre” was signed in Paris.

This International Standard allows the identification of calendar years by their year number for years both before and after the introduction of the Gregorian calendar. For the determination of calendar years, the year number and the calendar day within the calendar year only the rules mentioned above

are used. For the purposes of this International Standard the calendar based on these rules is referred to as the Gregorian calendar. The use of this calendar for dates preceding the introduction of the Gregorian calendar (also called the proleptic Gregorian calendar) should only be by agreement of the partners in information interchange.

The introduction of the Gregorian calendar included the cancellation of the accumulated inaccuracies of the Julian calendar. However, no dates shall be inserted or deleted when determining dates in the proleptic Gregorian calendar.

NOTE In the proleptic Gregorian calendar, the calendar year [0000] is a leap year.

EXAMPLE The Gregorian calendar was introduced on 15 October 1582. In the calendar set by this standard the calendar day preceding that calendar day is referred to as 14 October 1582. In the Julian calendar that calendar day is referred to as 4 October 1582.

Table 1 — Calendar months

Calendar month number	Calendar month name	Number of days in the month	Ordinal dates of the days in common years	Ordinal dates of the days in leap years
01	January	31	001-031	001-031
02	February	28 (leap year 29)	032-059	032-060
03	March	31	060-090	061-091
04	April	30	091-120	092-121
05	May	31	121-151	122-152
06	June	30	152-181	153-182
07	July	31	182-212	183-213
08	August	31	213-243	214-244
09	September	30	244-273	245-274
10	October	31	274-304	275-305
11	November	30	305-334	306-335
12	December	31	335-365	336-366

3.2.2 The week calendar

This International Standard allows the use of the week calendar time scale for the identification of calendar days.

This time scale is based on an unbounded series of contiguous calendar weeks. The calendar week number identifies the calendar week within the calendar year. Each calendar week has seven calendar days as indicated in Table 2.

The reference point of the time scale assigns Saturday to 1 January 2000.

Table 2 — Calendar days

Ordinal day number in the week	Calendar day name
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday
7	Sunday

NOTE 1 A calendar year has 52 or 53 calendar weeks.

NOTE 2 The first calendar week of a calendar year includes up to three days from the previous calendar year; the last calendar week of a calendar year includes up to three days from the following calendar year. Therefore, for certain calendar days the calendar date contains a different calendar year than the week date. For instance:
— Sunday 1 January 1995 is identified by the calendar date [1995-01-01] and week date [1994-W52-7]
— Tuesday 31 December 1996 is identified by the calendar date [1996-31-12] and week date [1997-W01-2].

NOTE 3 The rule for determining the first calendar week (see the definition of calendar week number in Clause 2) is equivalent with the rule "the first calendar week is the calendar week which includes 4 January".

3.2.3 Time scales within the calendar day

This International Standard recommends the use of time scales applying the 24-hour time keeping system for the identification of time points within a calendar day.

These time scales provide marks which, except in case of discontinuities, represent the duration elapsed after the start of the calendar day. In this International Standard these marks, which are collectively referred to as time of day, are represented by the number of hours elapsed after the beginning of the day, the number of minutes elapsed after the last full hour, the number of seconds elapsed after the last full minute, with decimal parts of a second if necessary.

3.3 Representations and format representations

This International Standard defines date and time representations to express time points, time intervals and recurring time intervals.

EXAMPLE The date and time representation [2003-02-10] identifies 10 February 2003.

To define the date and time representations permitted by this International Standard, use is made of date and time format representations in which specific characters are used to represent digits or other characters in date and time representations. A date and time format representation, together with its description, defines permitted date and time representations.

EXAMPLE The date and time format representation [YYYY-MM-DD], together with the associated description, defines the complete, extended format, calendar date representations permitted by this International Standard.

By mutual agreement the parties in information interchange may transfer the date and time format representations. Only the date and time format representations permitted by this International Standard shall be used.

The date and time format representations use characters that potentially expand into more than one character in the date and time representation; this is indicated by underlining. If at the time of information interchange of the date and time format representation the number of characters to be used in the date and time representation is known, the variable expansion representation (i.e. underlining) shall not be used.

EXAMPLE Local time with three decimals for the fraction of the seconds is represented by [hh:mm:ss,sss], not by [hh:mm:ss,s].

3.4 Characters used in the representations

3.4.1 Introduction

The representations specified in this International Standard make use of graphic characters as specified in 3.4. Note that, except for "hyphen", "minus" and "plus-minus", these characters are part of the ISO/IEC 646 repertoire.

In an environment where use is made of a character repertoire based on ISO/IEC 646, "hyphen" and "minus" are both mapped onto "hyphen-minus". Representations with a "plus-minus" shall only be used in such environment if the interchange repertoire includes "plus-minus".

In an environment where use is made of the ITU-T S.1 repertoire (e.g. telex) date and time format representations shall not be used.

In date and time format representations underlining of characters is used. In environments that do not support the representation of underlined characters, the underline shall precede the character to be underlined.

NOTE 1 In date and time representations lower case characters may be used when upper case characters are not available.

NOTE 2 Encoding of characters for the interchange of dates and times is not in the scope of this International Standard.

Unless explicitly allowed by this International Standard the character "space" shall not be used in the representations.

3.4.2 Characters used in place of digits or signs

In date and time format representations characters are used to represent characters in the date and time representations as follows:

[Y] represents a digit used in 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 a digit from a positive integer or zero;

[±] represents a plus sign [+] if in combination with the following element a positive value or zero needs to be represented (in this case, unless explicitly stated otherwise, the plus sign shall not be omitted), or a minus sign [−] if in combination with the following element a negative value needs to be represented.

In addition the following convention applies:

[_] When any of the characters representing a digit is underlined, it represents zero or more digits in the corresponding date and time representation.

Other characters in the date and time format representations are copied in the date and time representations.

3.4.3 Characters used as designators

In representations the following characters are used as designators:

[P] is used as duration designator, preceding the component which represents the duration;

NOTE The use of the character P is based on the historical use of the term “period” for duration.

[R] is used as recurring time interval designator;

[T] is used as time designator to indicate:

— the start of the representation of local time to designate local time expressions as such,

— the start of the representation of the time of day in date and time of day expressions,

— the start of the representation of the number of hours, minutes or seconds in expressions of duration;

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

[Z] is used as UTC designator.

In representations of duration (4.4.3.2), the following designators are used as part of the expression:

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

NOTE 1 In these expressions, [M] may be used to indicate “month” or “minute”, or both.

NOTE 2 In date and time format representations the interpretation of the characters [Y], [M] and [D] as characters used in place of digits or as designators depends on their position in the expression.

NOTE 3 These designators are used for the designation of units of time and nominal durations in the representations defined in this International Standard. For the designation of units of time and durations in other contexts ISO 31-1 should be applied.

3.4.4 Characters used as separators

In representations the following characters are 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”;

[:] (colon): to separate the time elements “hour” and “minute”, and “minute” and “second”;

[/] (solidus): to separate components in the representation of time intervals and recurring time intervals.

NOTE Representations defined in this International Standard also make use of the decimal separator.

3.5 Expansion

By mutual agreement of the partners in information interchange, it is permitted to expand the component identifying the calendar year, which is otherwise limited to four digits. This enables reference to dates and times in calendar years outside the range supported by complete representations, i.e. before the start of the year [0000] or after the end of the year [9999].

3.6 Leading zeros

If a time element in a defined representation has a defined length, then leading zeros shall be used as required.

3.7 Mutual agreement

Some of the representations identified in this International Standard are only allowed by mutual agreement of the partners in information interchange. Such agreement should ensure that fields in which the representation may occur are not allowed to hold other representations that cannot be unambiguously distinguished from the agreed representation.

4 Date and time representations

4.1 Date

4.1.1 General

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

4.1.2 Calendar date

4.1.2.1 General

In expressions of calendar dates

— **calendar year** is, unless specified otherwise, represented by four digits. Calendar years are numbered in ascending order according to the Gregorian calendar by values in the range [0000] to [9999]. Values in the range [0000] through [1582] shall only be used by mutual agreement of the partners in information interchange.

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

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

4.1.2.2 Complete representations

When the application identifies the need for a complete representation of a calendar date, it shall be one of the numeric expressions as follows, where [YYYY] represents a calendar year, [MM] the ordinal number of a calendar month within the calendar year, and [DD] the ordinal number of a calendar day within the calendar month.

Basic format:	YYYYMMDD	*Example:* 19850412
Extended format:	YYYY-MM-DD	*Example:* 1985-04-12

4.1.2.3 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 4.1.2.2, 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] is omitted, a separator shall be inserted between [YYYY] and [MM], but separators shall not be used in the other representations with reduced precision.

a) A specific month

Basic format:	YYYY-MM	*Example:*	1985-04
Extended format:	not applicable		

b) A specific year

Basic format:	YYYY	*Example:*	1985
Extended format:	not applicable		

c) A specific century

Basic format:	YY	*Example:*	19
Extended format:	not applicable		

4.1.2.4 Expanded representations

If, by agreement, expanded representations are used, the formats shall be as specified below. The interchange parties shall agree the additional number of digits in the time element year. In the examples below it has been agreed to expand the time element year with two digits.

a) A specific day

Basic format:	*±YYYYYMMDD*	*Example:*	*+0019850412*
Extended format:	*±YYYYY-MM-DD*	*Example:*	*+001985-04-12*

b) *A specific month*

Basic format:	*±YYYYY-MM*	*Example:*	*+001985-04*
Extended format:	*not applicable*		

c) *A specific year*

Basic format:	*±YYYYY*	*Example:*	*+001985*
Extended format:	*not applicable*		

d) *A specific century*

Basic format:	*±YYY*	*Example:*	*+0019*
Extended format:	*not applicable*		

NOTE 4.1.2.4 includes the definition of representations that are expanded and have reduced precision.

4.1.3 Ordinal date

4.1.3.1 General

In expressions of ordinal dates

— **calendar year** is represented as in 4.1.2.

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

4.1.3.2 Complete representations

When the application identifies the need for a complete representation of an ordinal date, it shall be one of the numeric expressions as follows, where [YYYY] represents a calendar year and [DDD] the ordinal number of a calendar day within the calendar year.

Basic format:	YYYYDDD	*Example:* 1985102
Extended format:	YYYY-DDD	*Example:* 1985-102

4.1.3.3 Expanded representations

If, by agreement, expanded representations are used the formats shall be as specified below. The interchange parties shall agree the additional number of digits in the time element year. In the examples below it has been agreed to expand the time element year with two digits.

A specific day

Basic format:	±YYYYYDDD	*Example:* +001985102
Extended format:	±YYYYY-DDD	*Example:* +001985-102

4.1.4 Week date

4.1.4.1 General

In expressions of week dates

— **calendar year** is represented as in 4.1.2.

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

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

4.1.4.2 Complete representations

When the application identifies the need for a complete representation of a week date, it shall be one of the alphanumeric expressions as follows, where [YYYY] 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 calendar day within the calendar week.

Basic format:	YYYYWwwD	*Example:* 1985W155
Extended format:	YYYY-Www-D	*Example:* 1985-W15-5

4.1.4.3 Representations with reduced precision

If the degree of precision required permits, one digit maybe omitted from the representation in 4.1.4.2.

A specific week		
Basic format:	YYYYWww	*Example:* 1985W15
Extended format:	YYYY-Www	*Example:* 1985-W15

4.1.4.4 Expanded representations

If, by agreement, expanded representations are used the formats shall be as specified below. The interchange parties shall agree the additional number of digits in the time element year. In the examples below it has been agreed to expand the time element year with two digits.

a)	A specific day		
Basic format:	±YYYYYWwwD	*Example:*	+001985W155
Extended format:	±YYYYY-Www-D	*Example:*	+001985-W15-5
b)	A specific week		
Basic format:	±YYYYYWww	*Example:*	+001985W15
Extended format:	±YYYYY-Www	*Example:*	+001985-W15

NOTE 4.1.4.4 includes the definition of representations that are expanded and have reduced precision.

4.2 Time of day

4.2.1 General

This International Standard is based on the 24-hour timekeeping system that is now in common use. In expressions of time of day

— **hour** is represented by two digits from [00] to [23]. ([24] shall not be used to represent hour.)

— **minute** is represented by two digits from [00] to [59].

— **second** is represented by two digits from [00] to [60]. The representation of the second by [60] is only allowed to indicate a positive leap second or an instant within that second.

NOTE 1 These expressions apply to both UTC and non-UTC based time scales for time of day.

NOTE 2 The expression "00:00:00" denotes beginning of day; for Information Technology Interchange there is no representation of end of day. Thus even though it is recognized that the expression "24:00:00" is used as a natural language expression to denote end of a day, this expression is not used for Information Technology Interchange.

4.2.2 Local time

4.2.2.1 General

In the representations of local time as defined below no provisions have been made to prevent ambiguities in expressions that result from discontinuities in the time scale of local time (e.g. daylight saving time). When an application identifies the need to prevent these ambiguities, use can be made of the provision of 4.2.5.2.

4.2.2.2 Complete representations

When the application identifies the need for an expression of local time then the complete representation shall be a single numeric expression 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

4.2.2.3 Representations with reduced precision

If the degree of precision required permits, either two or four digits may be omitted from the representation in 4.2.2.2.

a) A specific hour and minute

Basic format:	hhmm	*Example:* 2320
Extended format:	hh:mm	*Example:* 23:20

b) A specific hour

Basic format:	hh	*Example:* 23
Extended format:	not applicable	

4.2.2.4 Representations with decimal fraction

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 time elements (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 two zeros in accordance with 3.6.

The interchange parties, dependent upon the application, shall agree the number of digits in the decimal fraction. The format shall be [hhmmss,ss], [hhmm,mm] or [hh,hh] as appropriate (hour minute second, hour minute, and hour, respectively), with as many digits as necessary following the decimal sign. A decimal fraction shall have at least one digit. In the examples below it has been agreed to give the smallest time element a decimal fraction with one digit.

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

Basic format:	hhmmss,ss	*Example:*	232050,5

Extended format:	hh:mm:ss,ss	*Example:*	23:20:50,5

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

Basic format:	hhmm,mm	*Example:*	2320,8
Extended format:	hh:mm,mm	*Example:*	23:20,8

c) A specific hour and a decimal fraction of the hour

Basic format:	hh,hh	*Example:*	23,3
Extended format:	not applicable		

NOTE 4.2.2.4 includes the definition of representations that have both reduced precision and a decimal fraction.

4.2.2.5 Representations with time designator

In expressions of local time, applications may put the time designator [T] immediately in front of the representations defined in 4.2.2.2 through 4.2.2.4.

If the local time is represented in a context that does not clearly identify a local time expression, the time designator [T] shall be used immediately in front of the representations defined in 4.2.2.2 through 4.2.2.4.

4.2.3 Beginning of the day

The complete representations in basic and extended format for the beginning of the day, in accordance with 4.2.2, shall be expressed as follows:

Basic format	*Extended format*
000000	00:00:00

The representations may have reduced precision in accordance with 4.2.2.3 or may be designated as a time expression in accordance with 4.2.2.5. To represent the beginning of the day the representations may be expanded with a decimal fraction containing only zeros in accordance with 4.2.2.4.

NOTE The beginning of the day will normally be represented as [00:00].

4.2.4 UTC of day

To express UTC of day the representations specified in 4.2.2.2 through 4.2.2.4 shall be used, followed immediately, without space, by the UTC designator [Z]. The examples below are complete and reduced precision representations of the UTC of day 20 minutes and 30 seconds past 23 hours:

Basic format:	hhmmssZ	*Example:*	232030Z
	hhmmZ		2320Z
	hhZ		23Z
Extended format:	hh:mm:ssZ	*Example:*	23:20:30Z
	hh:mmZ		23:20Z
	not applicable		

4.2.5 Local time and Coordinated Universal Time (UTC)

4.2.5.1 Difference between local time and UTC of day

When it is required to indicate the difference between local time and UTC of day, the representation of the difference can be expressed in hours and minutes, or hours only. It shall be expressed as positive (i.e. with the leading plus sign [+]) if the local time is ahead of or equal to UTC of day and as negative (i.e. with the leading minus sign [-]) if it is behind UTC of day. The minutes time element of the difference may only be omitted if the difference between the time scales is exactly an integral number of hours.

Basic format:	±hhmm ±hh	*Example:*	+0100 +01
Extended format:	±hh:mm	*Example:*	+01:00

Expressions of the difference between local time and UTC of day are a component in the representations defined in 4.2.5.2; they shall not be used as self-standing expressions.

4.2.5.2 Local time and the difference from UTC

When it is required to indicate local time and the difference between the time scale of local time and UTC, the representation of the difference shall be appended to the representation of the local time following immediately, without space, the lowest order (extreme right-hand) time element of the local time expression. The difference between the time scale of local time and UTC shall be expressed in hours-and-minutes, or hours-only independent of the precision of the local time expression associated with it.

The complete representation of the time of 27 minutes and 46 seconds past 15 hours locally in Geneva (in winter one hour ahead of UTC), and in New York (in winter five hours behind UTC), together with the indication of the difference between the time scale of local time and UTC, are used as examples.

Basic format:	hhmmss±hhmm	*Example:*	152746+0100 152746 0500
	hhmmss±hh		152746+01 152746 05
Extended format:	hh:mm:ss±hh:mm	*Example:*	15:27:46+01:00 15:27:46 05:00
	hh:mm:ss±hh		15:27:46+01 5:27:46 05

1

In these expressions the local time component may be represented with reduced precision as defined in 4.2.2.3 or with decimal fraction as defined in 4.2.2.4.

4.3 Date and time of day

4.3.1 General

When the application does not clearly identify the need for only a date expression (see 4.1) or only a time of day expression (see 4.2), then a time point can be identified through a date and time of day expression.

4.3.2 Complete representations

The time elements of a date and time of day expression shall be written in the following sequence.

a) For calendar dates:
year – month – day of the month – time designator – hour – minute – second – zone designator

b) For ordinal dates:
year – day of the year – time designator – hour – minute – second – zone designator

c) For week dates:
year – week designator – week – day of the week – time designator – hour – minute – second – zone designator

The zone designator is empty if use is made of local time in accordance with 4.2.2.2 through 4.2.2.4, it is the UTC designator [Z] if use is made of UTC of day in accordance with 4.2.4 and it is the difference-component if use is made of local time and the difference from UTC in accordance with 4.2.5.2.

The character [T] shall be used as time designator to indicate the start of the representation of the time of day component in these expressions. The hyphen [-] and the colon [:] shall be used, in accordance with 4.4.4, as separators within the date and time of day expressions, respectively, when required.

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 date and time of day representation with others defined in this International Standard.

The following are examples of complete representations of date and time of day representations:

Basic format:	YYYYMMDDThhmmss	*Example:*	19850412T101530
	YYYYMMDDThhmmssZ		19850412T101530Z
	YYYYMMDDThhmmss±hhmm		19850412T101530+0400
	YYYYMMDDThhmmss±hh		19850412T101530+04
Extended format:	YYYY-MM-DDThh:mm:ss	*Example:*	1985-04-12T10:15:30
	YYYY-MM-DDThh:mm:ssZ		1985-04-12T10:15:30Z
	YYYY-MM-DDThh:mm:ss±hh:mm	1985-04-12T10:15:30+04:00	
	YYYY-MM-DDThh:mm:ss±hh		1985-04-12T10:15:30+04

Where complete representations using calendar dates are shown, ordinal dates (4.1.3.2) or week dates (4.1.4.2) may be substituted.

4.3.3 Representations other than complete

For reduced precision, decimal or expanded representations of date and time of day, any of the representations in 4.1.2 (calendar dates), 4.1.3 (ordinal dates) or 4.1.4 (week dates) followed immediately by the time designator [T] may be combined with any of the representations in 4.2.2.2 through 4.2.2.4 (local time), 4.2.4 (UTC of day) or 4.2.5.2 (local time and the difference from UTC) provided that

a) the rules specified in those sections are applied;

b) the resulting expression does not qualify as a complete representation in accordance with 4.3.2;

c) the date component shall not be represented with reduced precision;

NOTE This excludes also the date representations in 4.1.2.4 and 4.1.4.4 that are expanded and reduced.

d) the expression shall either be completely in basic format, in which case the minimum number of separators necessary for the required expression is used, or completely in extended format, in which case additional separators shall be used in accordance with 4.1 and 4.2.

The following are examples of reduced representations of combinations of date and time of day representations:

a) Calendar date and local time
Basic format: YYYYMMDDThhmm *Example:* 19850412T1015
Extended format: YYYY-MM-DDThh:mm *Example:* 1985-04-12T10:15

b) Ordinal date and UTC of day
Basic format: YYYYDDDThhmmZ *Example:* 1985102T1015Z
Extended format: YYYY-DDDThh:mmZ *Example:* 1985-102T10:15Z

c) Week date and local time and the difference from UTC
Basic format: YYYYWwwDThhmm±hhmm *Example:* 1985W155T1015+0400
Extended format: YYYY-Www-DThh:mm±hh *Example:* 1985-W15-5T10:15+04

4.4 Time interval

4.4.1 Means of specifying time intervals

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

a) by a start and an end;

b) by a duration and context information;

c) by a start and a duration;

d) by a duration and an end.

NOTE The time interval expressed by method b) is not fully determined by the information provided in the expression. It is assumed that, where needed, additional information to completely determine the time interval is available from the context. It should however be noted that, although the expression contains only duration information it represents a (not fully determined) time interval; not a duration.

4.4.2 Separators and designators

A time interval is expressed according to the following rules:

— a solidus [/] shall be used to separate the two components in each of 4.4.1 a), c) and d);

— for 4.4.1 b), c) and d) the designator [P] shall precede, without space, the remainder of the expression of duration;

— other designators shall be used as shown in 4.4.4 and 4.4.5 below.

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

4.4.3 Duration

4.4.3.1 General

Duration can be expressed by a combination of components with accurate duration (hour, minute and second) and components with nominal duration (year, month, week and day). The term duration will be used to designate expressions containing components with accurate duration, with nominal duration, or both.

NOTE 1 Applications requiring accurate duration using the time unit day can make use of the provisions of ISO 31-1.

NOTE 2 Duration is used as a component in representations of time intervals and recurring time intervals, representation of duration as such is not facilitated by this International Standard.

4.4.3.2 Format with designators

In expressions of time interval or recurring time interval, duration can be represented by a combination of components with designators. 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 these expressions the day component [nnD] is expressed as a multiple of the duration of a calendar day.

In both basic and extended format the complete representation of the expression for duration shall be [PnnW] or [PnnYnnMnnDTnnHnnMnnS].

In these representations the maximum number of digits in a component needs to be agreed by the partners in information interchange.

For reduced precision or decimal representations of this representation, the following rules apply.

a) If necessary for a particular application, the lowest order components may be omitted to represent duration with reduced precision.

b) If necessary for a particular application, the lowest order components may have a decimal fraction. 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. The decimal fraction shall at least have one digit, the maximum number of digits in the decimal component needs to be agreed by the partners in information interchange. If the magnitude of the number is less than unity, the decimal sign shall be preceded by a zero (see ISO 31-0).

c) If the number of years, months, days, hours, minutes or seconds in any of these expressions equals zero, the number and the corresponding designator may be absent; however, at least one number and its designator shall be present.

d) The designator [T] shall be absent if all of the time components are absent.

4.4.4 Complete representations

4.4.4.1 Representations of time intervals identified by start and end

When the application identifies the need for a complete representation of a time interval, identified by its start and its end, it shall use an expression in accordance with 4.4.2 combining any two complete date and time of day representations as defined in 4.3.2, provided that the resulting expression is either consistently in basic format or consistently in extended format.

Basic format:	YYYYMMDDThhmmss/YYYYMMDDThhmmss
Example:	19850412T232050/19850625T103000
Extended format:	YYYY-MM-DDThh:mm:ss/YYYY-MM-DDThh:mm:ss
Example:	1985-04-12T23:20:50/1985-06-25T10:30:00

The examples represent a time interval beginning at 20 minutes and 50 seconds past 23 hours on 12 April 1985 local time and ending at 30 minutes past 10 hours on 25 June 1985 local time.

4.4.4.2 Representations of time intervals by duration and context information

4.4.4.2.1 Format with designators

When an application identifies the need for a complete representation of a time interval through its duration and context information, with duration in the format with designators, it shall use an expression in accordance with 4.4.2 using a complete duration representation as defined in 4.4.3.2.

Basic and extended format:	PnnYnnMnnDTnnHnnMnnS PnnW
Example 1:	P2Y10M15DT10H30M20S
Example 2:	P6W

Example 1 represents a time interval with a duration of 2 years, 10 months, 15 days, 10 hours, 30 minutes and 20 seconds. Example 2 represents a time interval with a duration of six weeks.

4.4.4.2.2 Alternative format

If, by agreement, a complete representation of a time interval through its duration and context information, with duration in the alternative format, is used, the expression shall be in accordance with 4.4.2 and use a complete duration representation as defined in 4.4.3.3.

Basic format:	PYYYYMMDDThhmmss	*Example:*	P00021015T103020
Extended format:	PYYYY-MM-DDThh:mm:ss	*Example:*	P0002-10-15T10:30:20

The examples represent a time interval with a duration of 2 years, 10 months, 15 days, 10 hours, 30 minutes and 20 seconds.

4.4.4.3 Representations of time interval identified by start and duration

When the application identifies the need for a complete representation of a time interval identified by its start and its duration, it shall use an expression in accordance with 4.4.2, combining any complete date and time of day representation as defined in 4.3.2 with any complete representation of duration as

defined in 4.4.3, provided that the resulting expression is either consistently in basic format or consistently in extended format.

Basic format:	YYYYMMDDThhmmss/PnnYnnMnnDTnnHnnMnnS YYYYMMDDThhmmss/PYYYYMMDDThhmmss
Example:	19850412T232050/P1Y2M15DT12H30M0S 19850412T232050/P00010215T123000
Extended format:	YYYY-MM-DDThh:mm:ss/PnnYnnMnnDTnnHnnMnnS YYYY-MM-DDThh:mm:ss/PYYYY-MM-DDThh:mm:ss
Example:	1985-04-12T23:20:50/P1Y2M15DT12H30M0S 1985-04-12T23:20:50/P0001-02-15T12:30:00

The examples represent a time interval of 1 year, 2 months, 15 days, 12 hours and 30 minutes, beginning on 12 April 1985 at 20 minutes and 50 seconds past 23 hours local time.

4.4.4.4 Representations of time interval identified by duration and end

When the application identifies the need for a complete representation of a time interval identified by its duration and its end, it shall use an expression in accordance with 4.4.2, combining any complete representation of the duration as defined in 4.4.3 with any complete representation of date and time of day as defined in 4.3.2, provided that the resulting expression is either consistently in basic format or consistently in extended format.

Basic format:	PnnYnnMnnDTnnHnnMnnS/YYYYMMDDThhmmss PYYYYMMDDThhmmss/YYYYMMDDThhmmss
Example:	P1Y2M15DT12H30M0S/19850412T232050 P00010215T123000/19850412T232050
Extended format:	PnnYnnMnnDTnnHnnMnnS/YYYY-MM-DDThh:mm:ss PYYYY-MM-DDThh:mm:ss/YYYY-MM-DDThh:mm:ss
Example:	P1Y2M15DT12H30M0S/1985-04-12T23:20:50 P0001-02-15T12:30:00/1985-04-12T23:20:50

The examples represent a time interval of 1 year, 2 months, 15 days and 12 hours and 30 minutes, ending on 12 April 1985 at 20 minutes and 50 seconds past 23 hours local time.

4.4.4.5 Other complete representations

In 4.4.4.1 through 4.4.4.4 representations are shown using calendar date, local time and duration components. Other complete representations are found by making the following substitutions in each of 4.4.4.1 through 4.4.4.4:

— where representations using calendar dates in a time point component are shown, a complete representation of ordinal dates (4.1.3) or of week dates (4.1.4) may be substituted for the calendar date;

— where representations using local time in a time point component are shown, a complete representation of UTC (4.2.4) or local time and the difference from UTC (4.2.5.2) may be substituted for local time;

— where representations using the expression [PnnYnnMnnDTnnHnnMnnS] are shown, the expression [PnnW] (4.4.3.2) may be substituted.

4.4.5 Representations other than complete

A representation other than complete of a time interval shall be an expression in accordance with 4.4.1 and 4.4.2, where time points are represented in accordance with 4.1, 4.2 or 4.3 and where duration is represented in accordance with 4.4.3.2 or 4.4.3.3, provided that

a) the rules specified in those sections are applied;

b) the result is not a complete representation in accordance with 4.4.4; and

c) the resulting expression is either consistently in basic format or consistently in extended format.

The use of a representation needs to be agreed by the partners in information interchange if the use of any of its constituent parts needs to be agreed by these partners.

In the representation of time intervals in accordance with 4.4.1 a),

— higher order time elements may be omitted from the expression following the solidus (i.e. the representation for "end of time interval"); in such a case it shall be assumed that the corresponding time elements from the "start of time interval" expression apply (e.g. if [YYYYMM] are omitted, the end of the time interval is in the same calendar year and calendar month as the start of the time interval);

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

4.5 Recurring time interval

ISO 8601 Part 2, section 5 "Repeat Rules for Recurring Time Intervals", extends this section by adding a rule part to define the repeat pattern to the end of the recurring time interval structure.

4.5.1 Means of specifying recurring time intervals

A recurring time interval shall be expressed in one of the following ways.

— By a number of recurrences (optional), a start and an end. This represents a recurring time interval of which the first time interval is identified by the last two components of the expression and the number of recurrences by the first component. If the number of recurrences is absent, the number of occurrences is unbounded.

— By a number of recurrences (optional), a duration and context. This represents a recurring time interval with the indicated duration for each time interval and with the indicated number of recurrences. If the number of recurrences is absent, the number of occurrences is unbounded.

— By a number of recurrences (optional), a start and a duration. This represents a recurring time interval of which the first time interval is identified by the last two components of the expression and the number of recurrences by the first component. If the number of recurrences is absent, the number of occurrences is unbounded.

— By a number of recurrences (optional), a duration and an end. This represents a recurring time interval of which the last time interval is identified by the last two components of the expression and the number of recurrences by the first component. If the number of recurrences is absent, the number of occurrences is unbounded.

4.5.2 Separators and designators

A recursive time interval is expressed according to the following rule.

All representations start with the designator [R], followed, without spaces, by the number of recurrences, if present, followed, without spaces, by a solidus [/], followed, without spaces, by the expression of a time interval as per 4.4.1. For the representations 4.5.1 a), 4.5.1 b), 4.5.1 c) and 4.5.1 d) the time intervals as per 4.4.1 a), 4.4.1 b), 4.4.1 c) and 4.4.1 d) shall be used, respectively.

4.5.3 Complete representations

When the application identifies the need for a complete representation of a recurring time interval, it shall use an expression in accordance with 4.5.2, combining any complete time interval representation as defined in 4.4.4 with the number of recurrences.

Basic format:	Rn/YYYYMMDDThhmmss/YYYYMMDDThhmmss Rn/PnnYnnMnnDTnnHnnMnnS Rn/YYYYMMDDThhmmss/PnnYnnMnnDTnnHnnMnnS RnPnnYnnMnnDTnnHnnMnnS/YYYYMMDDThhmmss
Example:	R12/19850412T232050/19850625T103000 R12/P2Y10M15DT10H30M20S R12/19850412T232050/P1Y2M15DT12H30M0S R12/P1Y2M15DT12H30M0S/19850412T232050
Extended format:	Rn/YYYY-MM-DDThh:mm:ss/YYYY-MM-DDThh:mm:ss Rn/YYYY-MM-DDThh:mm:ss/PnYnMnDTnHnMnS Rn/PnnYnnMnnDTnnHnnMnnS/YYYY-MM-DDThh:mm:ss
Example:	R12/l985-04-12T23:20:50/1985-06-25T10:30:00 R12/1985-04-12T23:20:50/P1Y2M15DT12H30M0S R12/P1Y2M15DT12H30M0S/1985-04-12T23:20:50

4.5.4 Representations other than complete

A representation other than complete of a recurring time interval shall be an expression in accordance with 4.5.1 and 4.5.2, where the time interval is represented in accordance with 4.4.5.

5 Date and time format representations

For the description of the date and time representations in Clause 4, use has been made of date and time format representations in which characters are used either to represent themselves or to represent other characters (typically digits) in the date and time representations.

When an application identifies the need for the use of date and time format representations and by agreement of the communicating partners, the date and time format representations may be interchanged. A specific date and time format representation may only be interchanged

— if the interchange of data and time format representations in general has been agreed, and

— if applicable, if the interchange of date and time representations derived from the date and time format representation has been agreed.

EXAMPLE The date and time format representation [hh:mm:ss,sss] may only be interchanged if (1) the interchange of date and time format representations has been agreed and (2) the interchange of local time with a decimal fraction in the time element second with three decimal digits has been agreed.

Underlining of characters in a date and time format representation, to represent zero or more of the underlined characters in the derived date and time representation (in accordance with 3.4.2), is only permitted if, at the time of interchange of the date and time format representation, the number of characters in the derived date and time representation is not known.

The date and time format representations permitted by this International Standard are specified in Clause 4.

Annex A (normative) Extended Backus–Naur Form (EBNF)

A.1 Common Production Rules

```
The syntax used in this EBNF description is ISO/IEC 14977:1996

Rule:                    name = ... ;
Terminal:                '...' or "..."
Non Terminal:            ...
Concatination:           ,
Choice:                  |
Optional:                [...]
Repetition (0 or more): {...}
Repetition (1 or more): {...}-
Repetition (n times):    n * ...
Grouping:                (...)
Exception:               ...-...
Special sequence:        ?...?
Comment:                 (*...*)

(* Common Production Rules for Parts 1 and 2 of ISO 8601 *)

year = positiveYear | negativeYear | "0000" ;

positiveYear = positiveDigit, digit, digit, digit
             | "0", positiveDigit, digit, digit
             | "00", positiveDigit, digit
             | "000", positiveDigit ;

negativeYear = "-", positiveYear ;

monthDayBasic = ("01" | "03" | "05" |"07" |"08" |"10" |"12"), OneThru31
              | ("04" | "06" | "09" | "11"), OneThru30
              | "02", OneThru29 ;

monthDayExtended = ("01" | "03" | "05" |"07" |"08" |"10" |"12"), "-", OneThru31
                 | ("04" | "06" | "09" | "11"), "-", OneThru30
                 | "02-", OneThru29 ;

yearMonth = year "-" month ;

month = oneThru12 ;

day = oneThru31 ;

date = year | yearMonth | yearMonthDay ;

oneThru7 = ("1" | "2" | "3" | "4" | "5" | "6" | "7") ;

oneThru12 = ("0", positiveDigit) | "10" | "11" | 12" ;

oneThru29 = ("0", positiveDigit) | (("1" | "2"), digit) ;

oneThru30 = OneThru29 | "30" ;
```

```
oneThru31 = OneThru30 | "31" ;

digit = positiveDigit | "0" ;

positiveDigit = "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9" ;
```

A.2 Part 1 Production Rules

```
(* 4. Date and Time Representations *)

(* 4.1.2 Calendar date *)

(* 4.1.2.1 General *)

(* Calendar years are numbered in ascending order according to the *)
(* Gregorian calendar by values in the range [0000] to [9999].     *)
(* Values in the range [0000] through [1582] shall only be used by *)
(* mutual agreement of the partners in information interchange.    *)

calendarYear = positiveYear ;

calendarMonth = month ;

calendarDay = day ;

(* 4.1.2.2 Complete representations *)

calendarDateBasic = year, monthDayBasic ;

calendarDateExt = year, "-", monthDayExtended ;

(* 4.1.2.3 Representations with reduced precision *)

specificMonth = yearMonth ;

specificYear = positiveYear ;

specificCentury = 2 * digit ;

(* 4.1.2.4 Expanded representations *)

(* If, by agreement, expanded representations are used, the formats *)
(* shall be as specified below. The interchange parties shall agree *)
(* the additional number of digits in the time element year.        *)

specificDayExpandedBasic = {digit}-, calendarDateBasic ;

specificDayExpandedExtended = {digit}-, calendarDateExtended ;

specificMonthExpandedBasic = {digit}-, specificMonth ;

specificYearExpandedBasic = {digit}-, specificYear ;

specificCenturyExpandedBasic = {digit}-, specificCentury ;
```

```
(* 4.1.3 Ordinal date *)

(* 4.1.3.1 General *)

calendarYear = positiveYear ;

calendarDayOfTheYear = positiveDigit, digit, digit
                     | "0", positiveDigit, digit
                     | "00", positiveDigit ;

(* 4.1.3.2 Complete representations *)

specificOrdinalDayBasic = positiveYear, calendarDayOfTheYear ;

specificOrdinalDayExtended = positiveYear, "-", calendarDayOfTheYear ;

(* 4.1.3.3 Expanded representations *)

(* If, by agreement, expanded representations are used, the formats *)
(* shall be as specified below. The interchange parties shall agree *)
(* the additional number of digits in the time element year.        *)

specificDayExpandedBasic = {digit}-, specificOrdinalDayBasic ;

specificDayExpandedExtended = {digit}-, specificOrdinalDayExtended ;

(* 4.1.4 Week date *)

(* 4.1.4.1 General *)

calendarYear = positiveYear ;

calendarWeek = "0", positiveDigit
             | ("1" | "2" | "3" | "4" ), digit
             | "5", ("0" | "1" | "2" | "3" ) ;

calendarDayOfTheWeek = oneThru7 ;

(* Monday shall be identified as calendar day [1] of any calendar week, *)
(* and subsequent calendar days of the same calendar week shall be      *)
(* numbered in ascending sequence to Sunday (calendar day [7]).         *)

(* 4.1.4.2 Complete representations *)

weekDateComplete = calendarYear, "W" , calendarWeek, calendarDayOfWeek ;

weekDateExtended = calendarYear, "-W" , calendarWeek, "-", calendarDayOfWeek ;

(* 4.1.4.3 Representations with reduced precision *)

weekDateReduced = calendarYear, "W" , calendarWeek ;

weekDateReducedExtended = calendarYear, "-W" , calendarWeek ;
```



```
(* 4.1.4.4 Expanded representations *)

weekDateCompleteExp = {digit}-, calendarYear, "W" , calendarWeek,
                      calendarDayOfWeek ;

weekDateExtendedExp = {digit}-, calendarYear, "-W" , calendarWeek, "-",
                      calendarDayOfWeek ;

weekDateReducedExp = {digit}-, calendarYear, "W" , calendarWeek ;

weekDateReducedExtendedExp = {digit}-, calendarYear, "-W" , calendarWeek ;

(* 4.2 Time of day *)

(* 4.2.1 General *)

hour = "0", digit
     | "1", digit
     | "2", ( "0" | "1" | "2" | "3" ) ;

(* The representation of [24] shall not be used to represent hour.          *)

minute = ("0" | "1" | "2" | "3" | "4" | "5"), digit ;

second = (("0" | "1" | "2" | "3" | "4" | "5"), digit) | "60" ;

(* The representation of the second by [60] is allowed only to indicate the *)
(* addition of a positive leap second inserted after [23:59:59Z] and        *)
(* represented as [23:59:60Z]                                               *)

(* 4.2.2 Local time *)

(* 4.2.2.1 General *)

(* 4.2.2.2 Complete representations *)

timeCompleteBasic = hour, minute, second ;

timeCompleteExt = hour, ":", minute, ":", second ;

(* 4.2.2.3 Representations with reduced precision *)

timeHrMinBasic = hour, minute ;

timeHrMinExt = hour, ":", minute ;

timeHour = hour ;

(* 4.2.2.4 Representations with decimal fraction *)

decimalFraction = positiveDigit | digit, {digit}- ;

decimalSign = "," | "." ;
```



```
timeDecialHrMinSecBasic = hour, minute, second,
                          decimalSign, decimal Fraction ;

timeDecialHrMinSecExt = hour, ":", minute, ":", second,
                        decimalSign, decimal Fraction ;

timeDecialHrMinBasic = hour, minute,
                       decimalSign, decimal Fraction ;

timeDecialHrMinExt = hour, ":", minute,
                     decimalSign, decimal Fraction ;

timeDecimalHour = hour, decimalSign, decimal Fraction ;

(* 4.2.2.5 Representations with time designator *)

timeDesignator = "T" ;

(* 4.2.3 Beginning of the day *)

beginningOfDay = "00", ["00", ["00"]] | "00, [":00", [":00"]] ;

beginningOfDayHrMin = "00", ["00"] | "00, [":00"] ;

beginningOfDayHr = "00" ;

(* NOTE     The beginning of the day will normally be represented as [00:00] *)

(* 4.2.4 UTC of day *)

UTCofDayHrMinSecBasic = hour, minute, second, "Z" ;

UTCofDayHrMinSecExt = hour, ":", minute, ":", second, "Z" ;

UTCofDayHrMinBasic = hour, minute, "Z" ;

UTCofDayHrMinExt = hour, ":", minute, "Z" ;

UTCofDayHour = hour, "Z" ;

(* 4.2.5 Local time and Coordinated Universal Time (UTC) *)

(* 4.2.5.1 Difference between local time and UTC of day *)

UTCoffsetBasic = ("+" | "-"), (hour, minute | hour) ;

UTCoffsetExt = ("+" | "-"), (hour, ":", minute | hour) ;

(* 4.2.5.2 Local time and the difference from UTC *)

localPlusUTCbasic = hour, minute, second, UTCoffsetBasic ;

localPlusUTCext = hour, ":", minute, ":", second, UTCoffsetExt ;
```



```
(* 4.3 Date and time of day *)

(* 4.3.1 General *)

(* 4.3.2 Complete representations *)

dateTimeOfDayBasic = calendarDateBasic, "T", timeCompleteBasic,
                     [ "Z" | UTCoffsetBasic ] ;

dateTimeOfDayExt = calendarDateExt, "T", timeCompleteExt,
                   [ "Z" | UTCoffsetExt ] ;

(* 4.3.3 Representations other than complete *)

calendarDateLocalBasic  = calendarDateBasic, "T", timeHrMinBasic ;

calendarDateLocalExt  = calendarDateExt, "T", timeHrMinExt ;

ordinalDateUTCbasic  = specificOrdinalDayBasic, "T", timeHrMinBasic, "Z" ;

ordinalDateUTCext  = specificOrdinalDayExt, "T", timeHrMinExt, "Z" ;

weekDateLocalUTCbasic  = weekDateCompleteBasic, "T", timeHrMinBasic,
                         UTCoffsetBasic ;

weekDateLocalUTCext  = weekDateCompleteExt, "T", timeHrMinExt, UTCoffsetBasic ;

(* 4.4 Time interval *)

(* 4.4.1 Means of specifying time intervals *)

timeInterval = intervalExplicit
             | intervalDuration
             | intervalStartDuration
             | intervalDurationEnd ;

(* 4.4.2 Separators and designators *)

intervalSeparator = "/" ;

durationDesignator = "P" ;

(* 4.4.3 Duration *)

durationsecond = {digit}, "S" ;
durationminute = {digit}, "M", [durationsecond] ;
durationhour   = {digit}, "H", [durationminute] ;
durationtime   = "T", durationhour | durationminute | durationsecond ;
durationday    = {digit}, "D" ;
durationweek   = {digit}, "W" ;
durationmonth  = {digit}, "M", [durationday] ;
durationyear   = {digit}, "Y", [durationmonth] ;
durationdate   = durationday | durationmonth | durationyear, [durationtime] ;
```



```
duration = durationDesignator, durationdate | durationtime | durationweek ;

(* 4.4.4 Complete representations *)

(* 4.4.4.1 Representations of time intervals identified by start and end *)

intervalExplicit = dateTimeOfDayBasic, intervalSeparator, dateTimeOfDayBasic
                 | dateTimeOfDayExt, intervalSeparator, dateTimeOfDayExt ;

(* 4.4.4.2 Representations of time intervals by duration and context *)
(*         information                                                *)

durationAlternate = durationDesignator,
                    ( calendarDateBasic, "T", timeCompleteBasic ) |
                    ( calendarDateExt, "T", timeCompleteExt ) ;

intervalDuration = duration | durationAlternate ;

(* 4.4.4.3 Representations of time interval identified by start and duration *)

intervalStartDuration = dateTimeOfDayBasic, intervalSeparator, duration
                      | dateTimeOfDayExt, intervalSeparator, durationAternate ;

(* 4.4.4.4 Representations of time interval identified by duration and end *)

intervalDurationEnd = duration, intervalSeparator, dateTimeOfDayBasic
                    | durationAlternate, intervalSeparator, dateTimeOfDayBasic ;

(* 4.5 Recurring time interval *)

(* 4.5.1 Means of specifying recurring time intervals *)

recurringTimeInterval = recurringIntervalExplicit
                      | recurringIntervalDuration
                      | recurringIntervalStartDuration
                      | recurringIntervalDurationEnd ;

(* 4.5.2 Separators and designators *)

recurringIndicator = "R", {digit}, "/" ;

(* 4.5.3 Complete representations *)

recurringIntervalExplicit = recurringIndicator, intervalExplicit ;

recurringIntervalDuration = recurringIndicator, intervalDuration ;

recurringIntervalStartDuration = recurringIndicator, intervalStartDuration ;

recurringIntervalDurationEnd = intervalDurationEnd ;
```


Annex B (informative) Relationship to ISO 2014, ISO 2015, ISO 2711, ISO 3307 and ISO 4031

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:

— avoidance of the confusion between existing national conventions that use different systems of ascending order;

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

— arithmetic calculation, particularly in computer uses;

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

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; thus, ISO 2014, ISO 3307 and ISO 4031 have been superseded.

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; thus, ISO 2015 and ISO 2711 have now been superseded.

Annex C (informative) Examples of representations

C.1 Date and time representations

C.1.1 Date

Calendar date — 12 April 1985

Basic format	Extended format	Explanation
19850412	1985-04-12	Complete

Ordinal date — 12 April 1985

Basic format	Extended format	Explanation
1985102	1985-102	Complete

Week date — Friday 12 April 1985

Basic format	Extended format	Explanation
1985W155	1985-W15-5	Complete

Calendar week — 15th week of 1985

Basic format	Extended format	Explanation
1985W15	1985-W15	Reduced precision

Calendar month — April 1985

Basic format	Extended format	Explanation
1985-04	not applicable	Reduced precision

Calendar year — 1985

Basic format	Extended format	Explanation
1985	not applicable	Reduced precision

Calendar date —

Basic format	Extended format	Explanation
+0119850412	+011985-04-12	Expanded; six digits to represent the year. 12 April 11985
00020412	0002-04-12	Expanded; four digits to represent the year. The twelfth of April in the second year before the year [0000]

C.1.2 Time of day

Local time — 27 minutes and 46 seconds past 15 hours

Basic format	Extended format	Explanation

152746	15:27:46	Complete
1528	15:28	Reduced to hour and minute
15	not applicable	Reduced to hour

Local time with decimal fractions — 27 minutes and 35 and a half second past 15 hours

Basic format	Extended format	Explanation
152735,5	15:27:35,5	Complete, fraction with decimal

The beginning of a day

Basic format	Extended format	Explanation
000000	00:00:00	Complete
0000	00:00	Hour and minute only

UTC of day — 20 minutes and 30 seconds past 23 hours

Basic format	Extended format	Explanation
232030Z	23:20:30Z	Complete
2320Z	23:20Z	Reduced to hour and minute
23Z	not applicable	Reduced to hour

Local time and the difference from UTC —

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

Basic format	Extended format	Explanation
152746+0100	15:27:46+01:00	Complete
152746+01	5:27:46+01	Time difference expressed in hours only

27 minutes 46 seconds past 15 hours locally in New York (five hours behind UTC)

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

C.1.3 Date and time of day

Combinations of calendar date and local time

Basic format	Extended format	Explanation
19850412T101530	1985-04-12T10:15:30	Complete

Combinations of ordinal date and UTC of day

Basic format	Extended format	Explanation
1985102T235030Z	1985-102T23:50:30Z	Complete

Combinations of week date and local time

Basic format	Extended format	Explanation
1985W155T235030	1985-W15-5T23:50:30	Complete

C.1.4 Time interval

Defined by start and end

A time interval starting 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

Basic format	Extended format
19850412T232050/19850625T103000	1985-04-12T23:20:50/1985-06-25T10:30:00

A time interval starting at 12 April 1985 and ending on 25 June 1985

Basic format	Extended format
19850412/0625	1985-04-12/06-25

Defined by duration and context

A time interval of 2 years, 10 months, 15 days, 10 hours, 20 minutes and 30 seconds

Basic format	Extended format
P2Y10M15DT10H20M30S	not applicable
P00021015T102030	P0002-10-15T10:20:30

A time interval of 1 year and 6 months

Basic format	Extended format
P1Y6M	not applicable
P0001-06	not applicable

A time interval of seventy-two hours

Basic format	Extended format
PT72H	not applicable

Defined by start and duration

A time interval of 1 year, 2 months, 15 days and 12 hours, beginning on 12 April 1985 at 20 minutes past 23 hours

Basic format	Extended format

19850412T232000/P1Y2M15DT12H	1985-04-12T23:20:00/P1Y2M15DT12H

Defined by duration and end

A time interval of 1 year, 2 months, 15 days and 12 hours, ending on 12 April 1985 at 20 minutes past 23 hours

Basic format	Extended format
P1Y2M15DT12H/19850412T232000	P1Y2M15DT12H/1985-04-12T23:20:00

C.1.5 Recurring time interval

Defined by recurrences, duration and context

Fifteen recurrences of a time interval of 2 years, 10 months, 15 days, 10 hours, 20 minutes and 30 seconds

Basic format	Extended format
R15/P2Y10M15DT10H20M30S	not applicable

An unbounded number of recurrences of a time interval of 2 years, 15 days, 10 hours, 20 minutes and 30 seconds

Basic format	Extended format
R/P00020015T102030	R/P0002-00-15T10:20:30

Two recurrences of a time interval of 1 year and 6 months

Basic format	Extended format
R2/P1Y6M	not applicable
R2/P0001-06	not applicable

Eight recurrences of a time interval of 72 hours

Basic format	Extended format
R8/PT72H	not applicable

Defined by recurrences, duration and end

An unbounded number of occurrences of a time interval of 1 year, 2 months, 15 days and 12 hours of which the last occurrence ends at 12 April 1985 at 20 minutes and 50 seconds past 23 hours

Basic format	Extended format
R/P1Y2M15DT12H/19850412T232050	R/P1Y2M15DT12H/1985-04-12T23:20:50

C.2 Date and time format representations

C.2.1 Date

Basic format	Extended format	Explanation
YYYYMMDD	YYYY-MM-DD	complete calendar date
±YYYYYYDDD	±YYYYYY-DDD	expanded ordinal date with two digits added
YYYYWww	YYYY-Www	week date with precision reduced to week

C.2.2 Time of day

Basic format	Extended format	Explanation
hhmmss	hh:mm:ss	complete local time
hhmm,mZ	hh:mm,mZ	reduced precision UTC of day with one digit decimal fraction for minutes
hhmm±hhmm	hh:mm±hh:mm	local time and the difference from UTC — reduced accuracy

C.2.3 Date and time of day

Basic format	Extended format	Explanation
YYYYDDDThhmm	YYYY-DDDThh-mm	complete ordinal date — reduced precision time of day
YYYYMMDDhhmm,m	YYYY-MM-DDhh:mm,m	complete calendar date — reduced precision time of day with one digit decimal fraction for minute — no time designator
YYYYWwwDThh,hhZ	YYYY-Www-DThh,hhZ	complete week date — reduced precision UTC of day with two digit decimal fraction for the hour

C.2.4 Time interval

Time interval by start and end — complete calendar date — reduced precision UTC of day with one digit decimal fraction

Basic format	Extended format
YYYYMMDDThhmm,mZ/YYYYMMDDThhmm,m	YYYY-MM-DDThh:mm,mZ/YYYY-MM-DDThh:mm,m

Time interval by duration and context — duration with only day component of three digits

Basic format	Extended format

PnnnD	

Time interval by duration and context — duration with only hour component with one or more digits in the integral part and one or more digits in the decimal part

Basic format	Extended format
PTnn,nnH	

C.2.5 Recurring time interval

Time interval by number of recurrences, start and end — recurrence specified through zero or more digits — start and end by week date with reduced precision

Basic format	Extended format
Rn/YYYYWww/YYYYWww	Rn/YYYY-Www/YYYY-Www

Time interval by number of recurrences, begin and duration — recurrence specified through zero or more digits — start by complete ordinal date — duration by a number of days, where the number has at least one digit

Basic format	Extended format
Rn/YYYYDDD/PnnDRn/YYYY-DDD/PnnD	Rn/YYYY-DDD/PnnD

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