Microsoft XML Schema (Part 2: Datatypes) Standards Support Document

Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.** Microsoft publishes Open Specifications documentation ("this documentation") for protocols, file formats, data portability, computer languages, and standards support. Additionally, overview documents cover inter-protocol relationships and interactions.

- **Copyrights.** This documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you can make copies of it in order to develop implementations of the technologies that are described in this documentation and can distribute portions of it in your implementations that use these technologies or in your documentation as necessary to properly document the implementation. You can also distribute in your implementation, with or without modification, any schemas, IDLs, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the Open Specifications documentation.

- **No Trade Secrets.** Microsoft does not claim any trade secret rights in this documentation.

- **Patents.** Microsoft has patents that might cover your implementations of the technologies described in the Open Specifications documentation. Neither this notice nor Microsoft’s delivery of this documentation grants any licenses under those patents or any other Microsoft patents. However, a given Open Specifications document might be covered by the Microsoft Open Specifications Promise or the Microsoft Community Promise. If you would prefer a written license, or if the technologies described in this documentation are not covered by the Open Specifications Promise or Community Promise, as applicable, patent licenses are available by contacting iplg@microsoft.com.

- **License Programs.** To see all of the protocols in scope under a specific license program and the associated patents, visit the Patent Map.

- **Trademarks.** The names of companies and products contained in this documentation might be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights. For a list of Microsoft trademarks, visit www.microsoft.com/trademarks.

- **Fictitious Names.** The example companies, organizations, products, domain names, email addresses, logos, people, places, and events that are depicted in this documentation are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

**Reservation of Rights.** All other rights are reserved, and this notice does not grant any rights other than as specifically described above, whether by implication, estoppel, or otherwise.

**Tools.** The Open Specifications documentation does not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments, you are free to take advantage of them. Certain Open Specifications documents are intended for use in conjunction with publicly available standards specifications and network programming art and, as such, assume that the reader either is familiar with the aforementioned material or has immediate access to it.

**Support.** For questions and support, please contact dochelp@microsoft.com.
## Revision Summary

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision History</th>
<th>Revision Class</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/8/2010</td>
<td>0.1</td>
<td>New</td>
<td>Released new document.</td>
</tr>
<tr>
<td>10/13/2010</td>
<td>0.2</td>
<td>Minor</td>
<td>Clarified the meaning of the technical content.</td>
</tr>
<tr>
<td>2/10/2011</td>
<td>1.0</td>
<td>None</td>
<td>Introduced no new technical or language changes.</td>
</tr>
<tr>
<td>2/22/2012</td>
<td>2.0</td>
<td>Major</td>
<td>Significantly changed the technical content.</td>
</tr>
<tr>
<td>7/25/2012</td>
<td>2.1</td>
<td>Minor</td>
<td>Clarified the meaning of the technical content.</td>
</tr>
<tr>
<td>2/6/2013</td>
<td>2.2</td>
<td>Minor</td>
<td>Clarified the meaning of the technical content.</td>
</tr>
<tr>
<td>6/26/2013</td>
<td>3.0</td>
<td>Major</td>
<td>Significantly changed the technical content.</td>
</tr>
<tr>
<td>3/31/2014</td>
<td>3.0</td>
<td>None</td>
<td>No changes to the meaning, language, or formatting of the technical content.</td>
</tr>
<tr>
<td>1/22/2015</td>
<td>4.0</td>
<td>Major</td>
<td>Updated for new product version.</td>
</tr>
<tr>
<td>7/7/2015</td>
<td>4.1</td>
<td>Minor</td>
<td>Clarified the meaning of the technical content.</td>
</tr>
<tr>
<td>11/2/2015</td>
<td>4.1</td>
<td>None</td>
<td>No changes to the meaning, language, or formatting of the technical content.</td>
</tr>
<tr>
<td>1/20/2016</td>
<td>4.2</td>
<td>Minor</td>
<td>Clarified the meaning of the technical content.</td>
</tr>
<tr>
<td>3/22/2016</td>
<td>4.2</td>
<td>None</td>
<td>No changes to the meaning, language, or formatting of the technical content.</td>
</tr>
<tr>
<td>11/2/2016</td>
<td>4.2</td>
<td>None</td>
<td>No changes to the meaning, language, or formatting of the technical content.</td>
</tr>
<tr>
<td>3/14/2017</td>
<td>4.2</td>
<td>None</td>
<td>No changes to the meaning, language, or formatting of the technical content.</td>
</tr>
<tr>
<td>10/3/2017</td>
<td>4.2</td>
<td>None</td>
<td>No changes to the meaning, language, or formatting of the technical content.</td>
</tr>
</tbody>
</table>
# Table of Contents

1 **Introduction** ........................................................................................................... 4  
1.1 Glossary ................................................................................................................. 4  
1.2 References ............................................................................................................... 4  
1.2.1 Normative References ...................................................................................... 4  
1.2.2 Informative References .................................................................................... 4  
1.3 Microsoft Implementations ..................................................................................... 4  
1.4 Standards Support Requirements ........................................................................... 5  
1.5 Notation ................................................................................................................... 5  

2 **Standards Support Statements** ................................................................................. 6  
2.1 Normative Variations ............................................................................................... 6  
2.1.1 [W3C-XSD] Section 2.5.1.2, List datatypes ....................................................... 6  
2.1.2 [W3C-XSD] Section 3.2.3.2, Canonical representation .................................. 6  
2.1.3 [W3C-XSD] Section 3.2.4, float ...................................................................... 6  
2.1.4 [W3C-XSD] Section 3.2.5, double .................................................................... 7  
2.1.5 [W3C-XSD] Section 3.2.6.2, Order relation on duration ............................... 7  
2.1.6 [W3C-XSD] Section 3.2.6.3, Facet Comparison for durations ....................... 8  
2.1.7 [W3C-XSD] Section 3.2.7.1, Lexical representation ....................................... 8  
2.1.8 [W3C-XSD] Section 4.1.2.2, Derivation by list ............................................... 8  
2.1.9 [W3C-XSD] Section 4.3.1.4, Constraints on length Schema Components ........ 9  
2.2 Clarifications ............................................................................................................ 9  
2.2.1 [W3C-XSD] Section 3.2.6.2, Order relation on duration ............................... 9  
2.2.2 [W3C-XSD] Section 3.2.11, gYear .................................................................. 10  
2.2.3 [W3C-XSD] Section 3.2.12, gMonthDay ....................................................... 10  
2.2.4 [W3C-XSD] Section 3.2.13, gDay .................................................................... 10  
2.2.5 [W3C-XSD] Section 3.2.14, gMonth .............................................................. 11  
2.3 Error Handling ...................................................................................................... 11  
2.4 Security .................................................................................................................. 11  

3 **Change Tracking** .................................................................................................... 12  

4 **Index** .................................................................................................................... 13
1 Introduction

This document describes the level of support provided by the Microsoft XML Core Services (MSXML) 6.0 for XML Schema Part 2: Datatypes (Second Edition) [W3C-XSD], published on 28 October, 2004.


By way of MSXML6, Microsoft web browsers support XML Schema Part 2: Datatypes (Second Edition) [W3C-XSD].

The [W3C-XSD] specification may contain guidance for authors of webpages and browser users, in addition to user agents (browser applications). Statements found in this document apply only to normative requirements in the specification targeted to user agents, not those targeted to authors.

1.1 Glossary

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.


1.2.2 Informative References

None.

1.3 Microsoft Implementations

Throughout this document, Microsoft XML Core Services (MSXML) 6.0 is referred to as MSXML6.

MSXML6 implements the [W3C-XSD] specification.

The following Microsoft products implement some portion of the [W3C-XSD] specification, by way of MSXML6:

[MS-XMLSD] - v20171003
Microsoft XML Schema (Part 2: Datatypes) Standards Support Document
Copyright © 2017 Microsoft Corporation
Release: October 3, 2017
Each browser version may implement multiple document rendering modes. The modes vary from one another in support of the standard. The following table lists the document modes in each browser version that support the [W3C-XSD] specification.

<table>
<thead>
<tr>
<th>Browser version</th>
<th>Document modes supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Explorer 9</td>
<td>IE9 Mode</td>
</tr>
<tr>
<td>Internet Explorer 10</td>
<td>IE9 Mode, IE10 Mode</td>
</tr>
<tr>
<td>Internet Explorer 11</td>
<td>IE9 Mode, IE10 Mode, IE11 Mode</td>
</tr>
<tr>
<td>Internet Explorer 11 for Windows 10</td>
<td>IE9 Mode, IE10 Mode, IE11 Mode</td>
</tr>
</tbody>
</table>

### 1.4 Standards Support Requirements

To conform to [W3C-XSD], a user agent must implement all required portions of the specification. Any optional portions that have been implemented must also be implemented as described by the specification. Normative language is usually used to define both required and optional portions. (For more information, see [RFC2119].)

### 1.5 Notation

The following notations are used in this document to differentiate between notes of clarification, variation from the specification, and extension points.

<table>
<thead>
<tr>
<th>Notation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C####</td>
<td>Identifies a clarification of ambiguity in the target specification. This includes imprecise statements, omitted information, discrepancies, and errata. This does not include data formatting clarifications.</td>
</tr>
<tr>
<td>V####</td>
<td>Identifies an intended point of variability in the target specification such as the use of MAY, SHOULD, or RECOMMENDED. (See [RFC2119].) This does not include extensibility points.</td>
</tr>
<tr>
<td>E####</td>
<td>Identifies extensibility points (such as optional implementation-specific data) in the target specification, which can impair interoperability.</td>
</tr>
</tbody>
</table>

For document mode and browser version notation, see section 1.3.
2 Standards Support Statements

This section contains a full list of variations, clarifications, and extension points in the Microsoft implementation of [W3C-XSD].

- Section 2.1 includes only those variations that violate a MUST requirement in the target specification.
- Section 2.2 describes further variations from MAY and SHOULD requirements.
- Section 2.3 identifies variations in error handling.
- Section 2.4 identifies variations that impact security.

2.1 Normative Variations

The following subsections detail the normative variations from MUST requirements in [W3C-XSD].

2.1.1 [W3C-XSD] Section 2.5.1.2, List datatypes

V0001:

The specification states:

When a datatype is derived from a list datatype, the following constraining facets apply:

• length
• maxLength
• minLength
• enumeration
• pattern
• whiteSpace

For each of length, maxLength, and minLength, the unit of length is measured in number of list items. The value of whiteSpace is fixed to the value collapse.

MSXML6

Other values (preserve or replace) can be assigned to the whiteSpace facet when the base type of the list data type is string.

2.1.2 [W3C-XSD] Section 3.2.3.2, Canonical representation

V0002:

The specification states:

The canonical representation for decimal is defined by prohibiting certain options from the Lexical representation.

MSXML6

Canonicalization is included in digital signature, which is a feature removed from MSXML6.

2.1.3 [W3C-XSD] Section 3.2.4, float

V0002:

The specification states:
[Definition:]  float is patterned after the IEEE single-precision 32-bit floating point type [IEEE 754-1985]. The basic 'value space' of float consists of the values \( m \times 2^e \), where \( m \) is an integer whose absolute value is less than \( 2^{24} \), and \( e \) is an integer between -149 and 104, inclusive. In addition to the basic 'value space' described above, the 'value space' of float also contains the following three special values: positive and negative infinity and not-a-number (NaN). The 'order-relation' on float is: \( x < y \) iff \( y - x \) is positive for \( x \) and \( y \) in the value space. Positive infinity is greater than all other non-NaN values. NaN equals itself but is 'incomparable' with (neither greater than nor less than) any other value in the 'value space'.

**MSXML6**

No error is reported if the NaN value is compared with positive infinity or negative infinity.

### 2.1.4 [W3C-XSD] Section 3.2.5, double

**V0003:**

The specification states:

[Definition:]  The double datatype is patterned after the IEEE double-precision 64-bit floating point type [IEEE 754-1985]. The basic 'value space' of double consists of the values \( m \times 2^e \), where \( m \) is an integer whose absolute value is less than \( 2^{53} \), and \( e \) is an integer between -1075 and 970, inclusive. In addition to the basic 'value space' described above, the 'value space' of double also contains the following three special values: positive and negative infinity and not-a-number (NaN). The 'order-relation' on double is: \( x < y \) iff \( y - x \) is positive for \( x \) and \( y \) in the value space. Positive infinity is greater than all other non-NaN values. NaN equals itself but is 'incomparable' with (neither greater than nor less than) any other value in the 'value space'.

**MSXML6**

No error is reported if the NaN value is compared with positive infinity or negative infinity.

**V0004:**

The specification states:

Any value 'incomparable' with the value used for the four bounding facets ('minInclusive', 'maxInclusive', 'minExclusive', and 'maxExclusive') will be excluded from the resulting restricted 'value space'. In particular, when "NaN" is used as a facet value for a bounding facet, since no other double values are 'comparable' with it, the result is a 'value space' either having NaN as its only member (the inclusive cases) or that is empty (the exclusive cases). If any other value is used for a bounding facet, NaN will be excluded from the resulting restricted 'value space'; to add NaN back in requires union with the NaN-only space.

**MSXML6**

If NaN is used as a facet value for a bounding facet, when NaN is compared to other non-NaN doubles, NaN is less than any non-NaN number.

### 2.1.5 [W3C-XSD] Section 3.2.6.2, Order relation on duration

**V0005:**
The specification states:

Implementations are free to optimize the computation of the ordering relationship. For example, the following table can be used to compare durations of a small number of months against days.

**MSXML6**

Some comparisons that are indeterminate are considered to be true, such as the comparison between 1 month and 30 days.

### 2.1.6 [W3C-XSD] Section 3.2.6.3, Facet Comparison for durations

**V0006:**

The specification states:

In comparing duration values with minInclusive, minExclusive, maxInclusive and maxExclusive facet values indeterminate comparisons should be considered as "false".

**MSXML6**

Some comparisons that are indeterminate are considered to be true, such as P30D and P1M.

### 2.1.7 [W3C-XSD] Section 3.2.7.1, Lexical representation

**V0007:**

The specification states:

The **lexical space** of dateTime consists of finite-length sequences of characters of the form:

`'-?' yyyy '=' mm '=' dd 'T' hh ':' mm ':' ss ('.' s+)? (zzzzzz)?`, where

- `-?' yyyy is a four-or-more digit optionally negative-signed numeral that represents the year; if more than four digits, leading zeros are prohibited, and '0000' is prohibited (see the Note above (§3.2.7)); also note that a plus sign is not permitted);
- the remaining `-`s are separators between parts of the date portion;
- the first mm is a two-digit numeral that represents the month;
- dd is a two-digit numeral that represents the day;
- `T` is a separator indicating that time-of-day follows;
- hh is a two-digit numeral that represents the hour; '24' is permitted if the minutes and seconds represented are zero, and the dateTime value so represented is the first instant of the following day (the hour property of a dateTime object in the value space cannot have a value greater than 23);
- `:'` is a separator between parts of the time-of-day portion;
- the second mm is a two-digit numeral that represents the minute;
- ss is a two-integer-digit numeral that represents the whole seconds;
- `.s+` (if present) represents the fractional seconds;
- zzzzzz (if present) represents the timezone (as described below).

**MSXML6, IE9 Mode, IE10 Mode, and IE11 Mode (All Versions)**

Leading zeros are accepted if yyyy is more than four digits, such as 01987-10-12T00:00:00.

### 2.1.8 [W3C-XSD] Section 4.1.2.2, Derivation by list

**V0008:**
The specification states:

For each of ·length·, ·maxLength· and ·minLength·, the unit of length is measured in number of list items. The value of ·whiteSpace· is fixed to the value collapse.

**MSXML6**

The **whiteSpace** facet may have other values in addition to collapse.

### 2.1.9 [W3C-XSD] Section 4.3.1.4, Constraints on length Schema Components

V0009:

The specification states:

```
Schema Component Constraint: length and minLength or maxLength

1 If length is a member of {facets} then
   1.1 the (value) of minLength <= the (value) of length and
   1.2 there is type definition from which this one is derived by one or more restriction steps
        in which minLength has the same (value) and length is not specified.
2 It is an error for maxLength to be a member of {facets} unless
   2.1 the (value) of length <= the (value) of maxLength and
   2.2 there is type definition from which this one is derived by one or more restriction steps
        in which maxLength has the same (value) and length is not specified.
```

**MSXML6**

An error is reported when the **length** facet is a member of the `{facets}` set and either the **minLength** or **maxLength** facet is also a member of `{facets}`.

V0010:

The specification states:

```
Schema Component Constraint: length valid restriction

It is an ·error· if length is among the members of {facets} of {base type definition} and {value} is not equal to the {value} of the parent length.
```

**MSXML6**

No error is reported if the **length** facet value is different from the value of the parent **length** facet, unless one of the **length** facet values is fixed.

### 2.2 Clarifications

The following subsections identify clarifications to [W3C-XSD].

#### 2.2.1 [W3C-XSD] Section 3.2.6.2, Order relation on duration

V0011:

The specification states:
In general, the order relation on duration is a partial order since there is no determinate relationship between certain durations such as one month (P1M) and 30 days (P30D). The order relation of two duration values \( x \) and \( y \) is \( x < y \) iff \( s+x < s+y \) for each qualified dateTime \( s \) in the list below. These values for \( s \) cause the greatest deviations in the addition of dateTimes and durations. Addition of durations to time instants is defined in Adding durations to dateTimes (§E).

**MSXML6**

Some comparisons that are indeterminate are considered to be true, such as the comparison between 1 month and 30 days.

### 2.2.2 [W3C-XSD] Section 3.2.11, gYear

C0001:

The specification states:

Since the lexical representation allows an optional time zone indicator, gYear values are partially ordered because it may not be possible to unequivocally determine the order of two values one of which has a time zone and the other does not. If gYear values are considered as periods of time, the order relation on gYear values is the order relation on their starting instants. This is discussed in Order relation on dateTime (§3.2.7.4). See also Adding durations to dateTimes (§E). Pairs of gYear values with or without time zone indicators are totally ordered.

**MSXML6**

Indeterminate comparisons, such 2009Z with 2010, are considered to be determinate.

### 2.2.3 [W3C-XSD] Section 3.2.12, gMonthDay

C0002:

The specification states:

Since the lexical representation allows an optional time zone indicator, gMonthDay values are partially ordered because it may not be possible to unequivocally determine the order of two values one of which has a time zone and the other does not. If gMonthDay values are considered as periods of time, in an arbitrary leap year, the order relation on gMonthDay values is the order relation on their starting instants. This is discussed in Order relation on dateTime (§3.2.7.4). See also Adding durations to dateTimes (§E). Pairs of gMonthDay values with or without time zone indicators are totally ordered.

**MSXML6**

Indeterminate comparisons are considered to be determinate.

### 2.2.4 [W3C-XSD] Section 3.2.13, gDay

C0003:

The specification states:

Since the lexical representation allows an optional time zone indicator, gDay
values are partially ordered because it may not be possible to unequivocally determine the order of two values one of which has a time zone and the other does not. If gDay values are considered as periods of time, in an arbitrary month that has 31 days, the order relation on gDay values is the order relation on their starting instants. This is discussed in Order relation on dateTime (§3.2.7.4). See also Adding durations to dateTimes (§E). Pairs of gDay values with or without time zone indicators are totally ordered.

MSXML6

Indeterminate comparisons are considered to be determinate.

2.2.5 [W3C-XSD] Section 3.2.14, gMonth

C0004:
The specification states:

Since the lexical representation allows an optional time zone indicator, gMonth values are partially ordered because it may not be possible to unequivocally determine the order of two values one of which has a time zone and the other does not. If gMonth values are considered as periods of time, the order relation on gMonth is the order relation on their starting instants. This is discussed in Order relation on dateTime (§3.2.7.4). See also Adding durations to dateTimes (§E). Pairs of gMonth values with or without time zone indicators are totally ordered.

MSXML6

Indeterminate comparisons are considered to be determinate.

2.3 Error Handling

There are no additional error handling considerations.

2.4 Security

There are no additional security considerations.
3 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.
4 Index

C

Canonical representation 6
Change tracking 12
Constraints on length Schema Components 9

D

Derivation by list 8
double 7

F

Facet Comparison for durations 8
float 6

G
gDay 10
Glossary 4
gMonth 11
gMonthDay 10
gYear 10

I

Informative references 4
Introduction 4

L

Lexical representation 8
List datatypes 6

N

Normative references 4

O

Order relation on duration (section 2.1.5 7, section 2.2.1 9)

R

References
informative 4
normative 4

T

Tracking changes 12