



Guide to Schematron Rules and Patterns

MAC Schematron Guide

Version 2016-SEP

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Chapter 1 - Introduction

1.1 - Purpose

This is an informative supplement for MAC. This guide is generated from the MAC Schematron rules and provides a consolidated reference for the business rules of this specification.

1.2 - Overview

Chapter 2 is a listing of all the numbered rules in MAC. For each rule, there is a rule description, a code description, and a code block with the Schematron rule.

Chapter 3 is a listing of abstract patterns used in MAC. The abstract patterns may be used in numbered rules or provided as reference for use in rules developed by users of MAC. Each abstract pattern has a code description and a code block with the abstract Schematron pattern.

Chapter 4 is a listing of the master ISM Schematron file with all of the imports of rules and patterns. Many of the rules and patterns listed in Chapters 3 and 4 rely on functions and variables defined in the master file.

Chapter 5 is a listing of rules that have been deleted.

1.3 - Schematron

The business rules for MAC are encoded using ISO Schematron. Schematron is a rule-based validation language that uses XML Path Language to make assertions about an XML document.

MAC uses the XSLT 2.0 implementation of Schematron by Rick Jelliffe (2010-04-14) as its reference implementation. The only available identifying descriptors for this implementation are the implementer's name and date of release. This implementation may be found at the following URL: <http://code.google.com/p/schematron/>.



Important

The Schematron rules in this specification use XSLT 2.0 query binding.

1.4 - Conformance

This guide is informative. The Schematron rules listed here are normative in the sense that they convey criteria that a document **MUST** adhere to, exactly as English may be used to convey normative criteria. It is not necessary for implementers to use the specific Schematron encoding in this specification. Implementers **MAY** use any encodings, tools, or languages desired to implement validation schemes for conformance to this specification. However, to conform to the specification, validation schemes **MUST** match the behavior of the reference Schematron implementation. That is, a validator **MUST** find a document valid *if and only if* the reference Schematron implementation would find the document valid according to MAC's Schematron rules.

Chapter 2 - Rules

All of the numbered Rules for MAC are listed in this section. These rules may depend on patterns defined in the Abstract Patterns section or on variables defined in the Schematron Schema section.

Rules identifiers are all of the format MAC-ID-XXXXX, with rule files named MAC_ID_XXXXX.sch. Any other heading indicates a supporting file that may influence a rule but is not actually a numbered rule.

2.1 - ../Rules/MAC_ID_00001.sch

Rule Description

[MAC-ID-00001][Error] Every attribute in the document must be specified with a non-whitespace value.

Code Description

For each element with at least one attribute specified, this rule normalizes the space of the value of each attribute and make sure that the resulting string has a length greater than zero, which indicates non-whitespace content.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->
<sch:pattern id="MAC-ID-00001">
    <sch:rule context="*">
        <sch:assert test="every $attribute in ./@mac:* satisfies string-length(normalize-space(string($attribute))) > 0"
                    flag="error">[MAC-ID-00001][Error] Every attribute in the document must be specified with a non-whitespace value.</sch:assert>
    </sch:rule>
</sch:pattern>
```

2.2 - ../Rules/MAC_ID_00002.sch

Rule Description

[MAC-ID-00002][Error] The DESVersion of MAC must be 201609 for these rules to apply.

Code Description

For each element with attribute mac:DESVersion specified, this rule ensures that the value matches the version of this rule set.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->
<sch:pattern id="MAC-ID-00002">
    <sch:rule context="*[@mac:DESVersion]">
        <sch:assert test="matches(@mac:DESVersion, '^201609')" flag="error">[MAC-ID-00002][Error] The DESVersion of MAC must be 201609 for these rules to apply.</sch:assert>
    </sch:rule>
</sch:pattern>
```

2.3 - ../Rules/MAC_ID_00003.sch

Rule Description

[MAC-ID-00003][Error] The @tdf:version is less than the minimum version allowed: 3. Human Readable: The TDF version imported by MAC must be greater than or equal to 3.

Code Description

For all elements that contain @tdf:version, we verify that the version is greater than or equal to the minimum allowed version: 3.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->
<sch:pattern id="MAC-ID-00003">
  <sch:rule context="*[@tdf:version]">
    <sch:let name="version"
      value="number(if (contains(@tdf:version,'-')) then substring-before(@tdf:version,'-') else @tdf:version)"/>
    <sch:assert test="$version >= 3" flag="error">[MAC-ID-00003][Error] The @tdf:version is less than the minimum version allowed: 3. Human Readable: The TDF version
imported by MAC must be greater than or equal to 3.</sch:assert>
  </sch:rule>
</sch:pattern>
```


2.4 - ../Rules/MAC_ID_00004.sch

Rule Description

[MAC-ID-00004][Error] The @mime:CESVersion is less than the minimum version allowed: 201609. Human Readable: The MIME version imported by MAC must be greater than or equal to 2016-SEP.

Code Description

For all elements that contain @mime:CESVersion, we verify that the version is greater than or equal to the minimum allowed version: 201609.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->
<sch:pattern id="MAC-ID-00004">
  <sch:rule context="*[@mime:CESVersion]">
    <sch:let name="version"
      value="number(if (contains(@mime:CESVersion,'-')) then substring-before(@mime:CESVersion,'-') else @mime:CESVersion)"/>
    <sch:assert test="$version >= 201609" flag="error">The @mime:CESVersion is less than the minimum version allowed: 201609. Human Readable: The MIME version imported
by MAC must be greater than or equal to 2016-SEP.</sch:assert>
  </sch:rule>
</sch:pattern>
```

Chapter 3 - Abstract Patterns

There are no Abstract Patterns currently defined for MAC.

Chapter 4 - Schematron Schema

The top level Schematron file for MAC is in this section. This file imports all of the others and also defines many global variables they are all dependent on.

4.1 - ../MAC_XML.sch

Schematron Code

```
<?ICEA master?>
<!-- Notices - Distribution Notice:
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-->
<sch:schema queryBinding="xslt2">
  <sch:ns uri="urn:us:gov:ic:mac" prefix="mac"/>
  <sch:ns uri="urn:us:gov:ic:mime" prefix="mime"/>
  <sch:ns uri="urn:us:gov:ic:cve" prefix="cve"/>
  <sch:ns uri="http://www.w3.org/1999/xlink" prefix="xlink"/>
  <sch:ns uri="urn:us:gov:ic:tdf" prefix="tdf"/>
  <sch:ns uri="urn:us:gov:ic:edh" prefix="edh"/>
  <sch:ns uri="http://www.w3.org/2001/XMLSchema" prefix="xs"/>
  <!--*****--><!-- (U) MAC ID Rules --><!--*****--><!--(U) -->
<sch:include href="../Rules/MAC_ID_00001.sch"/>
  <sch:include href="../Rules/MAC_ID_00002.sch"/>
  <sch:include href="../Rules/MAC_ID_00003.sch"/>
  <sch:include href="../Rules/MAC_ID_00004.sch"/>
</sch:schema>
```

Chapter 5 - Removed Rules

There are no rules that have been removed for MAC.