



Guide to Schematron Rules and Patterns

DED Schematron Guide

Version 2019-MAR

December 1, 2022

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Chapter 1 - Introduction

1.1 - Purpose

This is an informative supplement for DED. This guide is generated from the DED 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 DED. 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 DED. The abstract patterns may be used in numbered rules or provided as reference for use in rules developed by users of DED. Each abstract pattern has a code description and a code block with the abstract Schematron pattern.

Chapter 4 is a listing of the master DED 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 DED are encoded using ISO Schematron. Schematron is a rule-based validation language that uses XML Path Language to make assertions about an XML document.

DED 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 DED's Schematron rules.

Chapter 2 - Rules

All of the numbered Rules for DED 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 DED-ID-XXXXX, with rule files named DED_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/DED_ID_00001.sch

Rule Description

[DED-ID-00001][warning] The ded:DESVersion attribute SHOULD be specified as version 201903 (Version:2019-MAR) with an optional extension.

Code Description

For each element with attribute DED: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="DED-ID-00001">
    <sch:rule context="*[@ded:DESVersion]" id="DED-ID-00001-R1">
        <sch:assert test="matches(@ded:DESVersion, '^201903(\-.{1,23})?$')"
            flag="warning"
            role="warning">[DED-ID-00001][warning] The ded:DESVersion attribute SHOULD be specified as version 201903 (Version:2019-MAR) with an optional extension. The
value provided was:
        <sch:value-of select="@ded:DESVersion"/>
        </sch:assert>
    </sch:rule>
</sch:pattern>
```

2.2 - ../Rules/DED_ID_00002.sch

Rule Description

[DED-ID-00002][Error] @icid:DESVersion must be declared.

Code Description

Check to verify that there exists a declaration of version for IC-ID.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->

<sch:pattern id="DED-ID-00002">
    <sch:rule context="/" id="DED-ID-00002-R1">
        <sch:assert test="exists(//*[@icid:DESVersion])" flag="error" role="error">[DED-ID-00002][Error] @icid:DESVersion must be declared.</sch:assert>
    </sch:rule>
</sch:pattern>
```

2.3 - ../Rules/DED_ID_00003.sch

Rule Description

[DED-ID-00003][Error] Regardless of the version indicated on the instance document, the validation infrastructure MUST use a version of 'IC-ID' that is version '1' or later. NOTE: This is not an error of the instance document but of the validation environment itself.

Code Description

This rule uses an abstract pattern to consolidate logic. It verifies that the validation infrastructure is using the version specified in parameters.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->

<sch:pattern id="DED-ID-00003" is-a="ValidateValidationEnvSchema">
    <sch:param name="MinVersion" value="'1'"/>
    <sch:param name="SpecToCheck" value="'IC-ID'"/>
    <sch:param name="pathToDocument" value="'../Schema/IC-ID/IC-ID.xsd'"/>
    <sch:param name="RuleID" value="'DED-ID-00003'"/>
</sch:pattern>
```

2.4 - ../Rules/DED_ID_00004.sch

Rule Description

[DED-ID-00004][Error] Regardless of the version indicated on the instance document, the validation infrastructure MUST use a version of 'IC-EDH' that is version '201903' (Version:2019-MAR) or later. NOTE: This is not an error of the instance document but of the validation environment itself.

Code Description

This rule uses an abstract pattern to consolidate logic. It verifies that the validation infrastructure is using the version specified in parameters.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->

<sch:pattern id="DED-ID-00004" is-a="ValidateValidationEnvSchema">
    <sch:param name="MinVersion" value="'201903'"/>
    <sch:param name="SpecToCheck" value="'IC-EDH'"/>
    <sch:param name="pathToDocument" value="'../Schema/IC-EDH/IC-EDH.xsd'"/>
    <sch:param name="RuleID" value="'DED-ID-00004'"/>
</sch:pattern>
```

2.5 - ../Rules/DED_ID_00005.sch

Rule Description

[DED-ID-00005][Error] Regardless of the version indicated on the instance document, the validation infrastructure MUST use a version of 'ISM' that is version '201903' (Version:2019-MAR) or later. NOTE: This is not an error of the instance document but of the validation environment itself.

Code Description

This rule uses an abstract pattern to consolidate logic. It verifies that the validation infrastructure is using the version specified in parameters.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->

<sch:pattern id="DED-ID-00005" is-a="ValidateValidationEnvCVE">
    <sch:param name="MinVersion" value="'201903'"/>
    <sch:param name="SpecToCheck" value="'ISM'"/>
    <sch:param name="pathToDocument"
        value="'../CVE/ISM/CVEnumISMClassificationAll.xml'"/>
    <sch:param name="RuleID" value="'DED-ID-00005'"/>
</sch:pattern>
```

2.6 - ../Rules/DED_ID_00006.sch

Rule Description

[DED-ID-00006][Error] If ded:ElementObligation has the value of ‘Conditional” then ded:ElementRestrictions must exist.

Code Description

For ded:DataElements with ded:ElementObligation with the value of ‘Conditional”, ded:ElementRestrictions must exist.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->

<sch:pattern id="DED-ID-00006">
    <sch:rule id="DED-ID-00006-R1"
              context="ded:DataElement[ded:ElementObligation/text()='Conditional']">
        <sch:assert test="ded:ElementRestrictions" flag="error" role="error">[DED-ID-00006][Error] If ded:ElementObligation has the value of ‘Conditional” then
ded:ElementRestrictions must exist.</sch:assert>
    </sch:rule>
</sch:pattern>
```

2.7 - ../Rules/DED_ID_00007.sch

Rule Description

[DED-ID-00007][Warning] For every optional element that exists in the document and can have text content, the element should have non-null, non-whitespace value.

Code Description

This pattern uses an abstract rule to consolidate logic. The abstract rule first concatenates the text values within the given element, separated by a single space. The resultant string is then normalized with leading and trailing whitespace removed, and the length of the string is determined to be greater than zero, which indicates non-whitespace content. The abstract rule is extended once for each optional element in the DED schema.

Schematron Code

```
<?ICEA pattern?>
<!-- Notices - Distribution Notice:
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-->

<sch:pattern id="DED-ID-00007">
    <sch:rule abstract="true" id="abs.rule00001">
        <sch:assert test="normalize-space(string())" flag="warning" role="warning">[DED-ID-00007][Warning] For every optional element that exists in the document and can have
text content, the element should have non-null, non-whitespace value.</sch:assert>
    </sch:rule>
    <!-- Begin using abstract rule on optional elements -->

<sch:rule id="DED-ID-00007-R1" context="ded:ElementRestriction">
    <sch:extends rule="abs.rule00001"/>
</sch:rule>
</sch:pattern>
```

Chapter 3 - Abstract Patterns

All of the Abstract Patterns for DED are listed in this section. These patterns may depend on variables defined in the Schematron Schema section.

3.1 - ./Lib/ValidateValidationEnvCVE.sch

Code Description

This abstract pattern checks to see if the validation environment has at least the version / revision of the CVE as of the writing of this specification. The calling rule must pass in \$MinVersion, \$SpecToCheck, \$pathToDocument, \$RuleID.

Schematron Code

```
<!--
  This abstract pattern checks to see the version of a CVE is greater than or equal to a passed in parameter.

  $MinVersion      := the version that SpecToCheck must be equal to or greater than.
  $SpecToCheck     := Name the spec whose version in the infrastructure is being checked.
  $pathToDocument  := Relative path to the document cve that has ther version string
  $RuleID          := The number of the rule in the concrete file.
-->

<sch:pattern xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
              abstract="true"
              id="ValidateValidationEnvCVE">
  <sch:rule id="ValidateValidationEnvCVE-R1" context="/">
    <sch:assert test="document($pathToDocument)//cve:CVE//@specVersion castable as xs:double and document($pathToDocument)//cve:CVE//@specVersion >= $MinVersion"
               flag="error"
               role="error">Version [
<sch:value-of select="document($pathToDocument)//cve:CVE//@specVersion"/>] of
<sch:value-of select="$SpecToCheck"/>found; Version [
<sch:value-of select="$MinVersion"/>] or later is required. The latest version of
<sch:value-of select="$SpecToCheck"/>is not being used in the validation infrastructure. Regardless of the version indicated on the instance document, the validation infrastructure needs
to use a version of
<sch:value-of select="$SpecToCheck"/>that is version [
<sch:value-of select="$MinVersion"/>] or later. NOTE: This is not an error of the instance document but of the validation environment itself. The incorrect value was found in
<sch:value-of select="document-uri(document($pathToDocument))"/>
    </sch:assert>
  </sch:rule>
</sch:pattern>
```

3.2 - ./Lib/ValidateValidationEnvSchema.sch

Code Description

This abstract pattern checks to see if the validation environment has at least the version / revision of the Schema as of the writing of this specification. The calling rule must pass in \$MinVersion, \$SpecToCheck, \$pathToDocument, \$RuleID.

Schematron Code

```
<!--
  This abstract pattern checks to see the version of a Schema is greater than or equal to a passed in parameter.

  $MinVersion      := the version that SpecToCheck must be equal to or greater than.
  $SpecToCheck     := Name the spec whose version in the infrastructure is being checked.
  $pathToDocument  := Relative path to the document xsd that has ther version string
  $RuleID          := The number of the rule in the concrete file.
-->

<sch:pattern xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
              abstract="true"
              id="ValidateValidationEnvSchema">
  <sch:rule id="ValidateValidationEnvSchema-R1" context="/">
    <sch:assert test="document($pathToDocument)//xsd:schema//@version castable as xs:double and document($pathToDocument)//xsd:schema//@version >= $MinVersion"
               flag="error"
               role="error">Version [
<sch:value-of select="document($pathToDocument)//xsd:schema//@version"/>] of
<sch:value-of select="$SpecToCheck"/>found; Version [
<sch:value-of select="$MinVersion"/>] or later is required. The latest version of
<sch:value-of select="$SpecToCheck"/>is not being used in the validation infrastructure. Regardless of the version indicated on the instance document, the validation infrastructure needs
to use a version of
<sch:value-of select="$SpecToCheck"/>that is version [
<sch:value-of select="$MinVersion"/>] or later. NOTE: This is not an error of the instance document but of the validation environment itself. The incorrect value was found in
<sch:value-of select="document-uri(document($pathToDocument))"/>
    </sch:assert>
  </sch:rule>
</sch:pattern>
```

Chapter 4 - Schematron Schema

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

4.1 - ../DED_XML.sch

Code Description

This is the root file for the specifications Schematron ruleset. It loads all of the required CVEs, declares some variables, and includes all of the Rule .sch files.

Schematron Code

```
<!--UNCLASSIFIED-->
<?ICEA master?>
<!-- Notices - Distribution Notice:
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-->
<!-- WARNING:
      Once compiled into an XSLT the result will
      be the aggregate classification of all the CVEs
      and included .sch files
-->

<sch:schema queryBinding="xslt2">
    <sch:ns uri="urn:us:gov:ic:ded" prefix="ded"/>
    <sch:ns uri="urn:us:gov:ic:ism" prefix="ism"/>
    <sch:ns uri="urn:us:gov:ic:id" prefix="icid"/>
    <sch:ns uri="urn:us:gov:ic:cve" prefix="cve"/>
    <!-- ***** -->
<!-- * Abstract Rule and Pattern Includes * -->
<!-- ***** -->

<sch:include href="../Lib/ValidateValidationEnvSchema.sch"/>
    <sch:include href="../Lib/ValidateValidationEnvCVE.sch"/>
    <!-- ***** -->
<!-- (U) DED ID Rules -->
<!-- ***** -->
<!--(U) -->

<sch:include href="../Rules/DED_ID_00001.sch"/>
    <sch:include href="../Rules/DED_ID_00002.sch"/>
    <sch:include href="../Rules/DED_ID_00003.sch"/>
    <sch:include href="../Rules/DED_ID_00004.sch"/>
    <sch:include href="../Rules/DED_ID_00005.sch"/>
    <sch:include href="../Rules/DED_ID_00006.sch"/>
    <sch:include href="../Rules/DED_ID_00007.sch"/>
    <!-- ***** -->
<!-- (U) DED Phases -->
<!-- ***** -->
</sch:schema>

<!--UNCLASSIFIED-->
```

Chapter 5 - Removed Rules

There are no rules that have been removed for DED.