



# **Guide to Schematron Rules and Patterns**

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## **IC-SF Schematron Guide**

### **Version 2021-NOV**

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## Chapter 1 - Introduction

### 1.1 - Purpose

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

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

IC-SF 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 IC-SF's Schematron rules.

## Chapter 2 - Rules

All of the numbered Rules for IC-SF 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 IC-SF-ID-XXXXX, with rule files named IC-SF\_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/IC-SF\_ID\_00001.sch

### Rule Description

[IC-SF-ID-00001][Warning] sf:DESVersion attribute SHOULD be specified as version 202111 (Version:2021-NOV) with an optional extension.

### Code Description

This rule supports extending the version identifier with an optional trailing hyphen and up to 23 additional characters. The version must match the regular expression “^202111(-.{1,23})?\$”.

### Schematron Code

```
<?ICEA pattern?>
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-->

<sch:pattern id="IC-SF-ID-00001">
    <sch:rule id="IC-SF-ID-00001-R1" context="*[@sf:DESVersion]">
        <sch:assert test="matches(@sf:DESVersion, '^202111(-.{1,23})?$')"
            flag="warning"
            role="warning">[IC-SF-ID-00001][Warning] sf:DESVersion attribute SHOULD be specified as version 202111 (Version:2021-NOV) with an optional extension.</
sch:assert>
        </sch:rule>
    </sch:pattern>
```

## 2.2 - ../Rules/IC-SF\_ID\_00002.sch

### Rule Description

[IC-SF-ID-00002][Error] The number of sfhashv:BlockHash is equal to the number in @sfhashv:totalBlocks.

### Code Description

This rule ensures that the number of sfhashv:BlockHash is equal to the number in @sfhashv:totalBlocks.

### Schematron Code

```
<?ICEA pattern?>
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-->

<sch:pattern id="IC-SF-ID-00002">
  <sch:rule id="IC-SF-ID-00002-R1"
    context="sfhashv:HashVerification | sfhashv:ContentEncodedHashVerification | sfhashv:ContentDecodedHashVerification">
    <sch:assert test="if (exists(sfhashv:TotalHash) and exists(sfhashv:BlockHash)) then count(sfhashv:BlockHash) = sfhashv:TotalHash/@sfhashv:totalBlocks else true()"
      flag="error"
      role="error">[IC-SF-ID-00002][Error] The number of sfhashv:BlockHash (
    <sch:value-of select="count(sfhashv:BlockHash)"/>) must equal the number in sfhashv:TotalHash/@sfhashv:totalBlocks (
    <sch:value-of select="sfhashv:TotalHash/@sfhashv:totalBlocks"/>).
    </sch:assert>
  </sch:rule>
</sch:pattern>
```

**Chapter 3 - Abstract Patterns**

There are no Abstract Patterns currently defined for IC-SF.



## Chapter 4 - Schematron Schema

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

## 4.1 - ./IC-SF\_XML.sch

### 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 xmlns:iscf="urn:us:gov:ic:sf"
            xmlns:sfhashv="urn:us:gov:ic:sf:hashverification"
            queryBinding="xslt2">
    <sch:ns uri="urn:us:gov:ic:ism" prefix="ism"/>
    <sch:ns uri="urn:us:gov:ic:sf" prefix="sf"/>
    <sch:ns uri="urn:us:gov:ic:sf:hashverification" prefix="sfhashv"/>
    <!--*****-->
<!-- (U) IC-SF Phases -->
<!--*****-->
<!--*****-->
<!-- (U) IC-SF ID Rules -->
<!--*****-->
<!--(U) -->

<sch:include href="./Rules/IC-SF_ID_00001.sch"/>
    <sch:include href="./Rules/IC-SF_ID_00002.sch"/>
    <!--*****-->
<!-- (U) IC-SF Phases -->
<!--*****-->
</sch:schema>

<!--UNCLASSIFIED-->
```

## Chapter 5 - Removed Rules

There are no rules that have been removed for IC-SF.