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## OGC KML 2.3 - Abstract Test Suite

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## Scope

This document specifies an abstract test suite (ATS) consisting of a set of implementation-independent test cases that provide a basis for validating the structure and content of OGC KML 2.3 resources. The ATS may be realized by an executable test suite (ETS) that assesses the degree of conformance exhibited by a KML document.

Three conformance levels are defined; these indicate the relative importance or priority of a particular set of constraints. The highest level (CL3) indicates full conformance, but a given application or user community may choose to enforce a lower level of conformance.

### *Level 1 (CL1)*

Includes test cases covering requirements that must be satisfied in all instances.

### *Level 2 (CL2)*

As for CL1, plus test cases addressing recommended requirements that should be satisfied.

### *Level 3 (CL3)*

As for CL2, plus test cases for optional constraints that are essentially informative in nature.

Several namespace bindings are assumed in this document (see Table 1). However, in an instance document the actual prefix bound to a given namespace is not significant; any legal [NCName](#) may be used.

Table 1: Namespace bindings

Prefix	Namespace name
kml	<a href="http://www.opengis.net/kml/2.2">http://www.opengis.net/kml/2.2</a>
xsd	<a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a>

## References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this document. For dated references, subsequent revisions do not apply. For undated references, the latest edition applies.

- OGC KML 2.3 (OGC 12-007)
- [Atom Syndication Format](#)
- [Uniform Resource Identifier \(URI\): Generic Syntax](#)
- [Extensible Address Language \(xAL\)](#), Version 2.0
- [XPointer Framework](#) (W3C Recommendation 25 March 2003)

# Conformance Level 1

## Purpose

Conformance Level 1 includes test cases that address absolute requirements. A KML document must satisfy all assertions at this level to achieve minimal conformance.

### ATC-101: Document element

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-101`
- b. Purpose: Verify that the root element of the document has [local name] = "kml" and [namespace name] = "http://www.opengis.net/kml/2.3".
- c. Method: Pass if all XML infoset constraints are satisfied; fail otherwise. This test checks that an XML resource is indeed an OGC KML document. If this test fails, all remaining tests are skipped.
- d. References:
  - OGC 12-007, 7.1.2
- e. Test type: Basic

### ATC-102: Schema validity

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-102`
- b. Purpose: Check that the KML document is well-formed and schema-valid with respect to the XML Schema grammars identified in Annex A.
- c. Method: Pass if the document satisfies all schema constraints; fail otherwise.
- d. References:
  - OGC 12-007, 5.3
- e. Test type: Capability

### ATC-103: Valid geometry coordinates

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-103`
- b. Purpose: Verify that a `kml:coordinates` element contains a list of white space-separated 2D or 3D tuples that contain comma-separated decimal values (lon,lat[,hgt]).
- c. Method: Pass if all `kml:coordinates` elements contain 2D/3D tuples containing decimal values conforming to the `xsd:decimal` type; fail otherwise. White space consists of one or more of the following characters: space (U+0020), carriage return (U+000D), line feed (U+000A), or tab (U+0009). The applicable coordinate reference system (CRS) is defined in Annex B of the OGC KML specification.
- d. References:
  - OGC 12-007, 16.10: `kml:coordinatesType`
  - OGC 12-007, Annex B: KML Coordinate Reference System Definition

- W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes - [decimal](#)
- e. Test type: Capability

### ATC-104: TimeSpan interval

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-104>
- b. Purpose: Verify that a TimeSpan element satisfies *all* of the following constraints:
  - 1. it includes at least one child element (kml:begin or kml:end);
  - 2. if it is a definite interval (that is, both kml:begin and kml:end are present), then the begin value is earlier than the end value.
- c. Method: Pass if all assertions are satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 15.2.2
- e. Test type: Capability

### ATC-105: TimeStamp value

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-105>
- b. Purpose: Verify that a kml:TimeStamp element has a valid child kml:when element.
- c. Method: Pass if the assertion is satisfied; fail otherwise. Several truncated representations of the xsd:dateTime data type are permitted: date, gYearMonth, and gYear. A time zone indicator is allowed.
- d. References:
  - OGC 12-007, 15.3.2
  - W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes - [Primitive Datatypes](#)
- e. Test type: Capability

### ATC-106: Valid style reference

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-106>
- b. Purpose: Check that a kml:styleUrl element satisfies all of the following constraints:
  - 1. its value is a valid relative or absolute URL that refers to a shared style definition (any element that substitutes for *kml:AbstractStyleSelectorGroup*);
  - 2. if the reference is an absolute URI, it conforms to the 'http' or 'file' URI schemes;
  - 3. it includes a fragment identifier that conforms to the shorthand pointer syntax as defined in the W3C XPointer framework.
- c. Method: Pass if all applicable assertions are satisfied; fail otherwise. A relative URL is resolved according to the reference resolution algorithm described in section 5 of RFC 3986.
- d. References:
  - OGC 12-007, 6.4: Shared Styles
  - OGC 12-007, 9.1.3.14

- XPointer Framework - [Shorthand Pointer](#)
- RFC 3986 - [Reference Resolution](#)
- e. Test type: Capability

### ATC-107: Shared styles

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-107`
- b. Purpose: Confirm that a shared style definition (any element that may substitute for *kml:AbstractStyleSelectorGroup*) satisfies all of the following constraints:
  - 1. its parent element is *kml:Document*;
  - 2. it has an 'id' attribute value.
- c. Method: Pass if all assertions are satisfied; fail otherwise. Shared styles include *kml:Style* and *kml:StyleMap* elements that appear as children of a *kml:Document* element.
- d. References:
  - OGC 12-007, 6.4: Shared Styles
- e. Test type: Capability

### ATC-108: Region extent

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-108`
- b. Purpose: Verify that the content of a *kml:LatLonAltBox* element satisfies all of the following conditions:
  - 1. *kml:north* > *kml:south*;
  - 2. *kml:east* > *kml:west*;
  - 3. *kml:minAltitude* <= *kml:maxAltitude*;
  - 4. if *kml:minAltitude* and *kml:maxAltitude* are both present, then *kml:altitudeMode* does **not** have the value "clampToGround".
- c. Method: Pass if all applicable constraints are satisfied; fail otherwise. The default envelope for a region is the entire surface of the EGM96 geoid. These checks verify that a region has a non-zero extent (a 3D envelope).
- d. References:
  - OGC 12-007, 9.19.2
- e. Test type: Capability

### ATC-109: Link properties

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-109`
- b. Purpose: Check that a link element (of type *kml:LinkType*) satisfies all of the following constraints:
  - 1. if present, the child *kml:refreshInterval* element has a positive value (> 0);
  - 2. if present, the child *kml:viewRefreshTime* element has a positive value (> 0);
  - 3. if present, the child *kml:viewBoundScale* element has a positive value (> 0).

- c. Method: Pass if a link element (*kml:Link*, *kml:AbstractOverlayType*/*kml:Icon*) adheres to all applicable constraints; fail otherwise.
- d. References:
  - OGC 12-007, cl. 13.1.3.2
  - OGC 12-007, cl. 13.1.3.4
  - OGC 12-007, cl. 13.1.3.5
- e. Test type: Capability

### ATC-110: Link referent

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-110>
- b. Purpose: Confirm that a link element refers to the correct resource type according to the appropriate case in Table 2.

Table 2: Link referents by parent element

Parent element	Referent	Acceptable media types
<i>kml:NetworkLink</i>	A KML (or KMZ) resource	<ul style="list-style-type: none"> <li>◦ <i>application/vnd.google-earth.kml+xml</i></li> <li>◦ <i>application/vnd.google-earth.kmz</i></li> </ul>
<i>kml:Model</i>	A textured 3D object resource, such as a COLLADA file	<ul style="list-style-type: none"> <li>◦ <i>model/vnd.collada+xml</i></li> <li>◦ <i>model/*</i></li> </ul>
<i>kml:AbstractOverlayType</i> <sup>a</sup>	An image resource	<ul style="list-style-type: none"> <li>◦ <i>image/*</i></li> </ul>
<sup>a</sup> Any of the following elements: <i>kml:GroundOverlay</i> , <i>kml:ScreenOverlay</i> , or <i>kml:PhotoOverlay</i> ,		

- c. Method: Pass if all link elements (*kml:Link*, *kml:AbstractOverlayType*/*kml:Icon*) have correct referents; fail otherwise.
- d. References:
  - OGC 12-007, 9.15.3.3
  - OGC 12-007, 10.9.3.8
  - OGC 12-007, 11.1.3.3
- e. Test type: Capability

### ATC-111: Valid bounding box

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-111>
- b. Purpose: Verify that the content of a *kml:LatLonBox* element satisfies all of the following constraints:
  1. it contains the *kml:north*, *kml:south*, *kml:east*, and *kml:west* elements;
  2. *kml:north* > *kml:south*;



- 3. `kml:east > kml:west`.
- c. Method: Pass if all assertions are satisfied; fail otherwise. The default envelope for a `kml:GroundOverlay` feature is the entire surface of the WGS 84 ellipsoid. These checks verify that a bounding box has a non-zero area.
- d. References:
  - OGC 12-007, 11.3.2
- e. Test type: Capability

### ATC-112: Geometry extrusion

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-112`
- b. Purpose: Check that if the `kml:extrude` element has the value "true", then the value of (the sibling element) `kml:altitudeMode` is **not** "clampToGround".
- c. Method: Pass if the assertion is satisfied; fail otherwise. This applies to the following elements: `kml:Point`, `kml:LineString`, `kml:LinearRing` (but NOT if it forms the boundary of a polygon), and `kml:Polygon`.
- d. References:
  - OGC 12-007, 10.4.2
- e. Test type: Capability

### ATC-113: Geometry tessellation

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-113`
- b. Purpose: Confirm that if the `kml:tessellate` element has the value "true", then the value of `kml:altitudeMode` is "clampToGround" (default value).
- c. Method: Pass if the assertion is satisfied; fail otherwise. This applies to the following elements: `kml:LineString`, `kml:LinearRing` (but NOT if it forms the boundary of a polygon), and `kml:Polygon`.
- d. References:
  - OGC 12-007, 10.6.2
- e. Test type: Capability

### ATC-114: Point coordinates

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-114`
- b. Purpose: Check that the `kml:coordinates` element in a `kml:Point` geometry contains exactly one coordinate tuple.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.3.2
- e. Test type: Capability

### ATC-115: LineString coordinates

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-115`

- b. Purpose: Verify that the `kml:coordinates` element in a `kml:LineString` geometry contains at least two coordinate tuples.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.7.3.7
- e. Test type: Capability

### **ATC-116: LinearRing coordinates**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-116`
- b. Purpose: Check that the `kml:coordinates` element in a `kml:LinearRing` geometry satisfies all of the following assertions:
  - 1. it contains at least 4 coordinate tuples;
  - 2. the first and last control points are identical (the ring is closed).
- c. Method: Pass if the assertions are satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.5.3.7
- e. Test type: Capability

### **ATC-117: Polygon boundary elements**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-117`
- b. Purpose: Verify that the boundary of a `kml:Polygon` element satisfies all of the following constraints:
  - 1. if it is not a descendant of `kml:Update`, then the `kml:Polygon` has a child `kml:outerBoundaryIs` element containing a `kml:LinearRing` element;
  - 2. each interior boundary defines a "hole" in the Polygon such that it lies within the exterior boundary.
- c. Method: Pass if all assertions are satisfied; fail otherwise. This test case verifies the fundamental structure of a polygon; curve orientation (coordinates order) is ignored. The relevant polygons are identified using this XPath expression: `//kml:Polygon[not(ancestor::kml:Update)]`.
- d. References:
  - OGC 12-007, 10.8.2
- e. Test type: Capability

### **ATC-118: Icon element refers to image**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-118`
- b. Purpose: Verify that the `kml:Icon/kml:href` element refers to an image resource.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The image format must correspond to a registered image media type, `image/*` (PNG, JPEG, and GIF images are commonly used). This test case applies to `kml:Icon` elements in both `kml:IconStyle` and `kml:AbstractOverlayType` contexts.

- d. References:
  - OGC 12-007, 12.13.2
  - OGC 12-007, 13.1.2
  - IANA Media Type Register - [image types](#)
- e. Test type: Capability

### **ATC-119: PhotoOverlay field of view**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-119`
- b. Purpose: Verify that a `kml:ViewVolume` element includes all of the following child elements: `kml:leftFov`, `kml:rightFov`, `kml:bottomFov`, `kml:topFov`, and `kml:near` (has non-negative value).
- c. Method: Pass if all expected elements are present; fail otherwise. The field of view for a `PhotoOverlay` is defined by four planes, each of which is specified by an angle relative to the view vector.
- d. References:
  - OGC 12-007, 11.5.2
- e. Test type: Capability

### **ATC-120: NetworkLinkControl refresh interval**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-120`
- b. Purpose: Verify that the `kml:NetworkLinkControl/kml:minRefreshPeriod` element has a non-negative value ( $\geq 0$ ).
- c. Method: Pass if the assertion is satisfied; fail otherwise. This element specifies the minimum time interval (in seconds) between refreshes of the referenced KML resource.
- d. References:
  - OGC 12-007, 13.4.3.1
- e. Test type: Capability

### **ATC-121: KML object content**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-121`
- b. Purpose: Verify that a KML object that is not a descendant of `kml:Update` satisfies one of the following constraints:
  - 1. it is not empty;
  - 2. it has an 'id' attribute value (to enable future updates).
- c. Method: Pass if the applicable assertion is satisfied; fail otherwise. The relevant context is `//kml:AbstractObjectType[not (ancestor::kml:Update)]`.
- d. References:
  - OGC 12-007, 8.1.4.1
- e. Test type: Capability

### **ATC-122: Update referent**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-122`

- b. Purpose: Check that the value of the `kml:Update/kml:targetHref` element is an absolute URI that refers to a KML or KMZ resource.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The URI is assumed to match the retrieval URI for a resource that was previously loaded (by some earth browser) with a network link (`kml:NetworkLink/kml:Link/kml:href`).
- d. References:
  - OGC 12-007, 13.5.3.1
  - KML Reference - [Updates](#)
- e. Test type: Capability

### **ATC-123: Update targets**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-123`
- b. Purpose: Check that a KML object which is a descendant (grandchild) of `kml:Update` satisfies the following constraints:
  - 1. it includes a 'targetId' attribute value that identifies the object to be updated;
  - 2. it does not have an 'id' attribute.
- c. Method: Pass if all assertions are satisfied; fail otherwise. Examine the content of all `kml:Create`, `kml>Delete` and `kml:Change` elements comprising the update.
- d. References:
  - OGC 12-007, 13.5.2
- e. Test type: Capability

### **ATC-124: Phone number**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-124`
- b. Purpose: Check that the value of the `kml:phoneNumber` element is a valid 'tel' URI that complies with [RFC 3966](#) ("The tel URI for Telephone Numbers").
- c. Method: Pass if the assertion is satisfied; fail otherwise. The "tel" URI is a globally unique identifier only; it does not refer to a specific physical device.
- d. References:
  - OGC 12-007, cl. 9.1.3.9
- e. Test type: Capability

### **ATC-125: Schema identifier**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-125`
- b. Purpose: Verify that a `kml:Schema` element has an 'id' attribute value.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The schema is referenced by `kml:SchemaData` elements that contain custom data.
- d. References:
  - OGC 12-007, 9.10.2
- e. Test type: Capability

## ATC-126: SimpleField definition

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-126`
- b. Purpose: Verify that a `kml:SimpleField` element satisfies all of the following constraints:
  - 1. it has a 'name' attribute;
  - 2. the value of the 'type' attribute is one of the supported XML Schema datatypes:
    - `xsd:string`
    - `xsd:int`
    - `xsd:unsignedInt`
    - `xsd:short`
    - `xsd:unsignedShort`
    - `xsd:float`
    - `xsd:double`
    - `xsd:boolean`
    - `xsd:date`
    - `xsd:dateTime`
- c. Method: Pass if all assertions are satisfied; fail otherwise. A type that is validly derived from a simple XSD datatype is also acceptable.
- d. References:
  - OGC 12-007, 9.11.2
  - OGC 12-007, 9.11.4.1
  - W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes - [Built-in Datatypes and Their Definitions](#)
- e. Test type: Capability

## ATC-127: SchemaData content

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-127`
- b. Purpose: Confirm that a `kml:SchemaData` element satisfies all of the following constraints:
  - 1. the 'schemaUrl' attribute value is a URL (it may be an absolute URI) with a fragment component that refers to a `kml:Schema` element;
  - 2. all `kml:SimpleData` child elements have a 'name' attribute that matches the name of a declared `kml:SimpleField` element in the associated `kml:Schema` element (see [ATC-126](#));
  - 3. the values of all `kml:SimpleData` child elements conform to their declared types.
- c. Method: Pass if all assertions are satisfied; fail otherwise. This element is used in conjunction with `kml:Schema` to add (loosely) typed custom data to a KML feature.
- d. References:
  - OGC 12-007, 9.5.2
  - OGC 12-007, 9.6.2
  - Uniform Resource Identifier (URI): Generic Syntax - [Fragment](#) (RFC 3986)
- e. Test type: Capability

## ATC-128: Data element has distinct name

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-128>
- b. Purpose: Check that the value of the 'name' attribute is unique within the context of the parent `kml:ExtendedData` element.
- c. Method: Pass if the assertion is satisfied; fail otherwise. Each `kml:Data` element represents an untyped name-value pair.
- d. References:
  - OGC 12-007, 9.4.2
- e. Test type: Capability

## ATC-129: Valid texture alias

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-129>
- b. Purpose: Verify that a `kml:Alias` element satisfies all of the following assertions:
  - 1. the value of the child `kml:targetHref` element is a URI reference to an image (texture) resource;
  - 2. the value of the child `kml:sourceHref` element corresponds to a file reference that appears within the 3D object resource referenced in the preceding sibling `kml:Link` element.
- c. Method: Pass if all assertions are satisfied; fail otherwise. The source file is expected to be a textual (including XML) digital asset resource such as a COLLADA file.
- d. References:
  - OGC 12-007, 10.14.3
  - [COLLADA 1.5.0 Specification](#) (April 2008)
- e. Test type: Capability

## ATC-130: Feature metadata - atom:author

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-130>
- b. Purpose: Check that an `atom:author` element satisfies all of the following assertions:
  - 1. the content of the child `atom:uri` element is an IRI reference;
  - 2. the content of the child `atom:email` element conforms to the "addr-spec" production rule in RFC 5322 (*Internet Message Format*).
- c. Method: Pass if all assertions are satisfied; fail otherwise. The content model is specified by the `atomPersonConstruct` pattern in the RELAX NG schema. Note that within a container element authorship is inherited by all child feature members; it may be overridden on a per-feature basis.
- d. References:
  - OGC 12-007, 9.1.3.5
  - The Atom Syndication Format - [Person Constructs](#) (RFC 4287)
  - [Internationalized Resource Identifiers \(IRIs\)](#) (RFC 3987)
  - Internet Message Format - [Addr-spec specification](#) (RFC 5322)
- e. Test type: Capability

### **ATC-131: Model orientation not empty**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-131`
- b. Purpose: Verify that if a `kml:Orientation` element is not a descendant of `kml:Update`, then it contains at least one of the following elements: `kml:heading`, `kml:tilt`, or `kml:roll`.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.11.2
- e. Test type: Capability

### **ATC-132: GroundOverlay with altitude**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-132`
- b. Purpose: Verify that a `kml:GroundOverlay` with an `kml:altitudeMode` value of "absolute" includes a `kml:altitude` element.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 9.20.2
- e. Test type: Capability

### **ATC-133: Model referents**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-133`
- b. Purpose: Check that a `kml:Model` element adheres to all of the following constraints if it is not a descendant of `kml:Update`:
  - 1. it contains a child `kml:Link` element (refers to a 3D model);
  - 2. it has a child `kml:Location` element (specifies model position);
  - 3. if the referenced model has any associated texture files, then there is a `kml:ResourceMap/kml:Alias` element for each one.
- c. Method: Pass if all assertions are satisfied; fail otherwise. The KML standard does not mention any particular type of 3D model. However, Google Earth only handles COLLADA files (`model/vnd.collada+xml`).
- d. References:
  - OGC 12-007, 10.9.2
  - KML Reference - [Model](#)
  - KML Developer's Guide - [Models](#)
- e. Test type: Capability

### **ATC-134: PhotoOverlay**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-134`
- b. Purpose: Check that if a `kml:PhotoOverlay` element is not a descendant of `kml:Update`, then it has all of the following child elements: `kml:Icon`, `kml:ViewVolume`, `kml:Point`, and `kml:Camera`.
- c. Method: Pass if all assertions are satisfied; fail otherwise.

- d. References:
  - OGC 12-007, 11.5.2
- e. Test type: Capability

### **ATC-135: Mode-specific feature style**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-135>
- b. Purpose: Check that if a `kml:Pair` element is not a descendant of `kml:Update`, then it contains the following elements:
  - 1. a `kml:key` element (identifies the style mode);
  - 2. a `kml:styleURL` or `kml:Style` element.
- c. Method: Pass if the assertions are satisfied; fail otherwise. The parent `kml:StyleMap` element contains alternative styles that apply for a particular mode; two values are defined in `kml:styleStateEnumType`: "normal" (default) and "highlight".
- d. References:
  - OGC 12-007, 12.4.2
- e. Test type: Capability

### **ATC-136: ItemIcon refers to image resource**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-136>
- b. Purpose: Check that if a `kml:ItemIcon` element is not a descendant of `kml:Update`, then it satisfies all of the following constraints:
  - 1. it has a `kml:href` child element that refers to an image resource;
  - 2. if its state includes the values "error" or "fetchingN" (where N = 0-2), then the associated feature is a `NetworkLink`.
- c. Method: Pass if all assertions are satisfied; fail otherwise. The referenced image is the icon used to indicate the state of a `Folder` or `Link` fetch. The ancestor `Style` element may be referenced from or contained within the feature that uses it.
- d. References:
  - OGC 12-007, 12.19.2
  - KML Reference - [ItemIcon](#)
- e. Test type: Capability

### **ATC-137: LookAt viewpoint**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-137>
- b. Purpose: Check that a `kml:LookAt` element satisfies all of the following constraints:
  - 1. if it is not a descendant of `kml:Update`, it contains all of the following child elements: `kml:longitude`, `kml:latitude`, and `kml:range`;
  - 2.  $0 \leq \text{kml:tilt} \leq 90$ ;
  - 3. if `kml:altitudeMode` does not have the value "clampToGround", then the `kml:altitude` element is present.



- c. Method: Pass if all assertions are satisfied; fail otherwise. The LookAt element positions a "virtual camera" in relation to the feature that is being viewed.
- d. References:
  - OGC 12-007, 14.3.2
  - OGC 12-007, 14.3.3
  - KML Reference - [LookAt](#)
- e. Test type: Capability

### ATC-138: Region visibility (LOD)

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-138>
- b. Purpose: Check that a kml:Lod element satisfies all of the following constraints:
  - 1. if it is not a descendant of kml:Update, it contains the kml:minLodPixels element;
  - 2. kml:minLodPixels < kml:maxLodPixels (Note: -1 denotes positive infinity).
- c. Method: Pass if all assertions are satisfied; fail otherwise. The visibility of a region (and its associated features) is determined as indicated below, where  $P$  denotes the calculated projected pixel size.

```
if (P < minLodPixels)
  opacity = 0
else if (P < minLodPixels + minFadeExtent)
  opacity = (P - minLodPixels)/minFadeExtent
else if (P < maxLodPixels - maxFadeExtent)
  opacity = 1
else if (P < maxLodPixels)
  opacity = (maxLodPixels-P)/maxFadeExtent
else
  opacity=0
```

- d. References:
  - OGC 12-007, 9.22.2
  - KML Reference - [Lod](#)
  - KML Developer's Guide - [Working with Regions](#)
- e. Test type: Capability

### ATC-139: Link reference

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-139>
- b. Purpose: Check that if a kml:Link or a kml:Icon element (both of type kml:LinkType) is not a descendant of kml:Update, then it contains a kml:href child element.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The value is a URI reference. The type of resource referred to depends on the parent element (see [ATC-110](#)).

- d. References:
  - OGC 12-007, 13.1.2
- e. Test type: Capability

### **ATC-140: Region**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-140`
- b. Purpose: Confirm that if a `kml:Region` element is not a descendant of `kml:Update`, it contains the `kml:LatLonAltBox` and `kml:Lod` elements.
- c. Method: Pass if the assertion is satisfied; fail otherwise. These elements are used to determine whether or not a region is considered to be "active".
- d. References:
  - OGC 12-007, 9.16.2
- e. Test type: Capability

### **ATC-141: Tour playlist**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-141`
- b. Purpose: Verify that if a `kml:Tour` element is not a descendant of `kml:Update`, then it has a `kml:Playlist` child element that contains one or more tour primitives.
- c. Method: Pass if the assertion is satisfied; fail otherwise. A virtual tour consists of a sequence of tour primitives. A tour primitive is any element that can substitute for *kml:AbstractTourPrimitiveGroup*.
- d. References:
  - OGC 12-007, 9.23.2
- e. Test type: Capability

### **ATC-142: FlyTo view**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-142`
- b. Purpose: Verify that a `kml:FlyTo` element contains a child view element (`kml:Camera` or `kml:LookAt`).
- c. Method: Pass if the assertion is satisfied; fail otherwise. A view element must substitute for *kml:AbstractViewGroup*.
- d. References:
  - OGC 12-007, 9.27.2
  - KML Developer's Guide - [FlyTo and flyToMode](#)
- e. Test type: Capability

### **ATC-143: TourControl not empty**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-143`
- b. Purpose: Verify that if a `kml:TourControl` element is not a descendant of `kml:Update`, then it contains a child `kml:playMode` element (or an allowable substitution).

- c. Method: Pass if the assertion is satisfied; fail otherwise. This element may be used to insert a user-controlled pause.
- d. References:
  - OGC 12-007, 9.30.2
  - KML Reference - [TourControl](#)
- e. Test type: Capability

#### **ATC-144: SoundCue refers to audio resource**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-144>
- b. Purpose: Check that if a kml:SoundCue element is not a descendant of kml:Update, then it has a kml:href child element that refers to an audio resource (media type audio/\*).
- c. Method: Pass if the assertion is satisfied; fail otherwise. Sounds are played in parallel with the rest of the tour. Commonly used audio formats are listed below.
  - MP3 (audio/mpeg)
  - M4A (audio/mp4, with AAC encoding)
- d. References:
  - OGC 12-007, 9.29.2
  - KML Developer's Guide - Touring in KML - [Adding sound](#)
  - IANA Media Type Register - [audio](#)
- e. Test type: Capability

#### **ATC-145: AnimatedUpdate referent**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-145>
- b. Purpose: Check that the value of the kml:AnimatedUpdate/kml:Update/kml:targetHref element satisfies one of the following cases:
  - 1. it is an absolute URI that refers to a KML or KMZ resource;
  - 2. it is empty (the target elements are in the same document).
- c. Method: Pass if the assertion is satisfied; fail otherwise. Changes to KML features will be reverted when the tour is over, and will not be saved at any time.
- d. References:
  - OGC 12-007, 9.26.3.2
  - KML Reference - [AnimatedUpdate](#)
- e. Test type: Capability

#### **ATC-146: Track positions**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-146>
- b. Purpose: Verify that the coordinates specifying the track positions (kml:coord) consist of space-delimited numeric values in the applicable coordinate reference system (CRS).
- c. Method: Pass if the assertion is satisfied; fail otherwise. A kml:Track element may be used to describe the time-varying position of a Placemark feature that represents a moving object. In the default CRS (see Annex B), the coordinate tuple values are longitude, latitude, and

altitude. An empty `kml:coord` element is permitted to indicate missing position data; the estimated position may be determined using some interpolation method.

- d. References:
  - OGC 12-007, 10.15.3.8
  - OGC 12-007, Annex B
- e. Test type: Capability

### **ATC-147: Track properties constitute parallel array**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-147`
- b. Purpose: Check that for every temporal value (`kml:when`) in a `kml:Track` there is a position (`kml:coord`) value. That is, the following XPath expression must be true: `count(kml:when) = count(kml:coord)`.
- c. Method: Pass if the assertion is satisfied; fail otherwise. A temporal value may be represented by a period such a day, month, or year; this might be the case for an object that moves slowly or one whose position is observed infrequently.
- d. References:
  - OGC 12-007, 10.15.2
- e. Test type: Capability

### **ATC-148: Track orientations**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-148`
- b. Purpose: Verify that each orientation element contained by a track (`kml:angles`) satisfies the following constraints:
  - 1. contains 1 or 3 space-delimited numeric values specifying an angle of rotation (heading, tilt, roll);
  - 2. if the track has no associated model, then only one angle (heading) is specified.
- c. Method: Pass if the assertion is satisfied; fail otherwise. A non-empty value specifies an additional heading, tilt, and roll value for the corresponding track position.
- d. References:
  - OGC 12-007, 10.15.3.9
- e. Test type: Capability

### **ATC-149: LatLonQuad coordinates**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-149`
- b. Purpose: Verify that the coordinates of a `LatLonQuad` element contained by a `GroundOverlay` feature satisfies the following constraints:
  - 1. it contains exactly four coordinate tuples;
  - 2. the coordinates are specified in counter-clockwise order with the first coordinate corresponding to the lower-left corner of the overlaid image;
  - 3. the quadrilateral is convex (every internal angle  $\leq 180$  degrees).

- c. Method: Pass if all constraints are satisfied; fail otherwise. If present, the third value in a coordinate tuple is ignored (altitude is set using the kml:altitude element).
- d. References:
  - OGC 12-007, 11.4.2
- e. Test type: Capability

## Conformance Level 2

### Purpose

Includes all tests in Level 1, plus test cases covering requirements that should be satisfied by a KML document. Non-conformance at this level may hinder the utility, portability, or interoperability of the document.

### ATC-201: PolyStyle not empty

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-201>
- b. Purpose: Check that if a `kml:PolyStyle` element is not a descendant of `kml:Update`, it contains at least one of the following elements: `kml:color`, `kml:colorMode`, `kml:fill`, or `kml:outline`.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 12.16.2
- e. Test type: Capability

### ATC-202: 3D coordinates

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-202>
- b. Purpose: Confirm that a `kml:coordinates` or `kml:Location` element includes a third value (elevation) in every coordinate tuple if its sibling `kml:altitudeMode` element does NOT have the value "clampToGround".
- c. Method: Pass if the assertion is satisfied; fail otherwise. Applies to the control points in *kml:AbstractGeometryType*/`kml:coordinates` and `kml:Model`/`kml:Location`.
- d. References:
  - OGC 12-007, 9.20.2
- e. Test type: Capability

### ATC-203: Scale element not empty

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-203>
- b. Purpose: Verify that if a `kml:Scale` element is not a descendant of `kml:Update`, it contains at least one of the following elements: `kml:x`, `kml:y`, or `kml:z`.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.12.2
- e. Test type: Capability

### ATC-204: Document element not empty

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-204>

- b. Purpose: Verify that the root element (kml:kml) contains at least one child element: kml:NetworkLinkControl or any element that substitutes for *kml:AbstractFeatureType*.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 7.1.2
- e. Test type: Capability

### **ATC-205: viewFormat element not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-205>
- b. Purpose: Verify that a kml:viewFormat contains at least one view parameter.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The query string is expected to contain one or more name-value pairs encoded as specified for application/x-www-form-urlencoded entities.
- d. References:
  - OGC 12-007, 13.1.2
  - OGC 12-007, 13.1.3.6
  - IANA Media Type Register - [application/x-www-form-urlencoded](http://www.iana.org/media-types/application/x-www-form-urlencoded)
- e. Test type: Capability

### **ATC-206: httpQuery element not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-206>
- b. Purpose: Verify a kml:httpQuery contains at least one query parameter.
- c. Method: Pass if the httpQuery has at least one of the allowable parameters; fail otherwise. The query string is expected to contain one or more name-value pairs encoded as specified for application/x-www-form-urlencoded entities.
- d. References:
  - OGC 12-007, 13.1.2
  - OGC 12-007, 13.1.3.7
- e. Test type: Capability

### **ATC-207: LinearRing in polygon boundary**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-207>
- b. Purpose: Verify that a kml:LinearRing element that constitutes the boundary of a polygon does not contain any of the following elements: kml:extrude, kml:tessellate, or kml:altitudeMode.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.5.2
- e. Test type: Capability

## **ATC-208: Data element not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-208>
- b. Purpose: Check that a `kml:Data` element (that contains an untyped name-value pair) has both a 'name' attribute and a `kml:value` child element. Furthermore, the value of the name attribute shall be unique within the context of its parent `kml:ExtendedData` element.
- c. Method: Pass if the assertion is satisfied; fail otherwise. This is the simplest means of adding custom data to a KML feature.
- d. References:
  - OGC 12-007, 9.4.2
- e. Test type: Capability

## **ATC-209: ResourceMap aliases**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-209>
- b. Purpose: Verify that a `kml:ResourceMap` element contains at least one `kml:Alias` child element, and that each alias has a unique `kml:sourceHref` value.
- c. Method: Pass if all assertions are satisfied; fail otherwise. Each alias renames a texture file referenced in the source digital asset (COLLADA) file.
- d. References:
  - OGC 12-007, 10.13.2
- e. Test type: Capability

## **ATC-210: Link refresh mode**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-210>
- b. Purpose: Check that a `kml:Link` or a `kml:Icon` element (of type `kml:LinkType`) adheres to all of the following constraints:
  - 1. if the `kml:refreshInterval` element is present, the `kml:refreshMode` value must be "onInterval";
  - 2. if the `kml:viewRefreshTime` element is present, the `kml:refreshMode` value must be "onStop".
- c. Method: Pass if all relevant assertions are satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 13.2.1
- e. Test type: Capability

## **ATC-211: PhotoOverlay with large image**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-211>
- b. Purpose: Check that if a `kml:PhotoOverlay` element includes a `kml:Icon`/`kml:href` element containing `[x]`, `[y]`, and `[level]` parameters, then it also includes a child `kml:ImagePyramid` element; the converse must also be true.



- c. Method: Pass if the assertions are satisfied; fail otherwise. Check for the `kml:ImagePyramid` element when the `x`, `y`, and `level` parameters are present; if the `kml:ImagePyramid` element occurs then check for the presence of the `x`, `y`, and `level` parameters. The tile parameters are embedded within the URL (which need not be constructed exactly as shown in the following example).

**EXAMPLE**

```
http://server.example.org/bigphoto/[$level]/row_[$x]
_column_[$y].jpg
```

- d. References:
  - OGC 12-007, 11.5.2
  - KML Developer's Guide - [Adding PhotoOverlays](#)
- e. Test type: Capability

### **ATC-212: GroundOverlay extent**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-212`
- b. Purpose: Verify that if a `kml:GroundOverlay` element is not a descendant of `kml:Update`, then its geographic extent is specified by either a `kml:LatLonBox` or a `kml:LatLonQuad` element.
- c. Method: Pass if the assertion is satisfied; fail otherwise. See [ATC-111](#).
- d. References:
  - OGC 12-007, 11.2.2
- e. Test type: Capability

### **ATC-213: Camera position**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-213`
- b. Purpose: Check that a `kml:Camera` element satisfies all of the following constraints:
  - 1. if it is not a descendant of `kml:Update`, then the following child elements are present: `kml:latitude`, `kml:longitude`, and `kml:altitude`;
  - 2. the value of `kml:altitudeMode` is not "clampToGround".
- c. Method: Pass if the assertions are satisfied; fail otherwise. A camera view is defined in terms of its position and orientation; it is not confined to the Earth's surface.
- d. References:
  - OGC 12-007, 14.2.2
- e. Test type: Capability

### **ATC-214: Model location**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-214`
- b. Purpose: Check that a `kml:Location` element satisfies all of the following constraints:
  - 1. it contains the `kml:longitude` and `kml:latitude` elements;

2. if the parent `kml:Model` element has a `kml:altitudeMode` value that is **not** "clampToGround", then the `kml:altitude` element must also be present.
- c. Method: Pass if all applicable assertions are satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 9.20.2
  - OGC 12-007, 10.9.2
  - OGC 12-007, 10.10.2
- e. Test type: Capability

### **ATC-215: Overlay has image**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-215>
- b. Purpose: Check that if any element that substitutes for *kml:AbstractOverlayGroup* is not a descendant of `kml:Update`, then it contains a `kml:Icon` child element (that refers to an image).
- c. Method: Pass if the assertion is satisfied; fail otherwise. This test applies to the following elements: `kml:GroundOverlay`, `kml:PhotoOverlay`, and `kml:ScreenOverlay`.
- d. References:
  - OGC 12-007, 11.1.2
- e. Test type: Capability

### **ATC-216: ScreenOverlay specifies point on screen**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-216>
- b. Purpose: Check that if a `kml:ScreenOverlay` element is not a descendant of `kml:Update`, then it has a `kml:screenXY` child element.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The specified point is relative to the screen origin (lower left corner).
- d. References:
  - OGC 12-007, 11.11.2
- e. Test type: Capability

### **ATC-217: BalloonStyle not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-217>
- b. Purpose: Check that if a `kml:BalloonStyle` element is not a descendant of `kml:Update`, it is not empty.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 12.7.2
- e. Test type: Capability

### **ATC-218: ExtendedData not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-218>

- b. Purpose: Check that if a `kml:ExtendedData` element is not a descendant of `kml:Update`, it is not empty.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 9.3.2
- e. Test type: Capability

### **ATC-219: Folder not empty**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-219`
- b. Purpose: Check that if a `kml:Folder` element is not a descendant of `kml:Update`, then it is not empty.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 9.13.2
- e. Test type: Capability

### **ATC-220: IconStyle not empty**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-220`
- b. Purpose: Check that if a `kml:IconStyle` element is NOT a descendant of `kml:Update`, it is not empty.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 12.12.2
- e. Test type: Capability

### **ATC-221: Image tiling**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-221`
- b. Purpose: Check that if a `kml:ImagePyramid` element is not a descendant of `kml:Update`, it satisfies all of the following constraints:
  - 1. it has the `kml:maxWidth` and `kml:maxHeight` child elements;
  - 2. the `kml:tileSize` value is a power of 2 ( $2^n$ ).
- c. Method: Pass if all assertions are satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 11.9.2
  - KML Reference - [ImagePyramid](#)
  - KML Developer's Guide - [Adding PhotoOverlays](#)
- e. Test type: Capability

### **ATC-222: LabelStyle not empty**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-222`
- b. Purpose: Check that if a `kml:LabelStyle` element is not a descendant of `kml:Update`, it has at least one of the following child elements: `kml:color`, `kml:colorMode`, or `kml:scale`.
- c. Method: Pass if the assertion is satisfied; fail otherwise.

- d. References:
  - OGC 12-007, 12.14.2
- e. Test type: Capability

### **ATC-223: ListStyle not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-223>
- b. Purpose: Check that if a `kml:ListStyle` element is not a descendant of `kml:Update`, it has at least one of the following child elements: `kml:listItemType`, `kml:bgColor`, or `kml:ItemIcon`.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 12.17.2
- e. Test type: Capability

### **ATC-224: Style not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-224>
- b. Purpose: Check that if a `kml:Style` element is not a descendant of `kml:Update`, it is not empty.
- c. Method: Pass if the assertion is satisfied; fail otherwise. A style group can be collected in a `kml:Document` container and shared by multiple features.
- d. References:
  - OGC 12-007, 12.2.2
- e. Test type: Capability

### **ATC-225: MultiGeometry not empty**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-225>
- b. Purpose: Check that if a `kml:MultiGeometry` element is not a descendant of `kml:Update`, it contains two or more geometry elements.
- c. Method: Pass if the assertion is satisfied; fail otherwise. The members of the collection must substitute for *`kml:AbstractGeometryGroup`*.
- d. References:
  - OGC 12-007, 10.2.2
- e. Test type: Capability

### **ATC-226: Placemark has geometry**

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-226>
- b. Purpose: Check that if a `kml:Placemark` element is not a descendant of `kml:Update`, it includes a geometry element (any element that substitutes for *`kml:AbstractGeometryGroup`*).
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 9.14.2
- e. Test type: Capability

## ATC-227: StyleMap content

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-227`
- b. Purpose: Check that if a `kml:StyleMap` element is not a descendant of `kml:Update`, it contains two `kml:Pair` elements where one has the key value "normal" and the other has the key value "highlight".
- c. Method: Pass if the assertion is satisfied; fail otherwise. This element is used to provide alternative styles for Placemark features; each style is identified by a 'key' value corresponding to a display mode.
- d. References:
  - OGC 12-007, 12.3.2
- e. Test type: Capability

## ATC-228: FlyTo duration

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-228`
- b. Purpose: Verify that a `kml:FlyTo` element satisfies all of the following constraints:
  - 1. it has a specified flight duration (in seconds)  $\geq 0$ ;
  - 2. it specifies a method of flight (`flyToMode`).
- c. Method: Pass if all assertions are satisfied; fail otherwise. The `flyToMode` element informs an earth browser about how to approach the viewing position; the default value is "bounce" (begin and end at rest).
- d. References:
  - OGC 12-007, 9.27.2
- e. Test type: Capability

## ATC-229: Wait duration

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-2/atc-229`
- b. Purpose: Check that a `kml:Wait` element specifies a duration (in seconds)  $> 0$ .
- c. Method: Pass if the assertion is satisfied; fail otherwise. This tour primitive pauses the view, but not the tour timeline—sound files and animated updates should continue to play.
- d. References:
  - OGC 12-007, 9.32.2
  - KML Developer's Guide - [Waiting and pausing](#)
- e. Test type: Capability

## ATC-230: AnimatedUpdate duration

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-230`
- b. Purpose: Verify that the `kml:AnimatedUpdate/kml:duration` element specifies a duration (in seconds)  $> 0$ .

- c. Method: Pass if the assertion is satisfied; fail otherwise. Any changes that can be interpolated (e.g. properties with numeric or geometry values) are animated over the specified duration; otherwise the changes are applied at the end of the specified duration.
- d. References:
  - OGC 12-007, 9.26.3
  - KML Reference - [AnimatedUpdate](#)
  - KML Developer's Guide - Touring in KML - [Updates](#)
  - KML Developer's Guide - [Updates](#)
- e. Test type: Capability

### **ATC-231: Entity references in BalloonStyle text**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-231`
- b. Purpose: Verify that replacement text values exist for any entity references appearing in a `kml:BalloonStyle/kml:text` element. The references are constructed as follows:
  - 1. `[$name]`: refers to either an element or an attribute of the containing feature, or to one of its extended data elements (`//kml:Data/@name`).
  - 2. `[$name/displayName]`: refers to the `kml:displayName` element in an extended data element (`//kml:Data/@name`) belonging to the feature.
  - 3. `[$schemaName/fieldName]`: refers to a descendant `kml:SimpleData` element that is defined by a `kml:SimpleField` element matching this XPath expression: `kml:Schema[@name=$schemaName]/kml:SimpleField[@name=$fieldName]`.
  - 4. `[$schemaName/fieldName/displayName]`: refers to the `kml:displayName` element in a `kml:Schema` element matching this XPath expression: `kml:Schema[@name=$schemaName]/kml:SimpleField[@name=$fieldName]/displayName`.
- c. Method: Pass if all entity references can be dereferenced; fail otherwise. The source of values for the replacement text includes the ancestor feature being styled and any `kml:Schema` elements that are associated with it.
- d. References:
  - OGC 12-007, 6.5
  - KML Reference - [BalloonStyle](#)
- e. Test type: Capability

### **ATC-232: Feature metadata - atom:link**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-1/atc-232`
- b. Purpose: Check that the value of the `atom:link/@rel` attribute is "related".
- c. Method: Pass if the assertion is satisfied; fail otherwise. If the attribute is not present, the link must be interpreted as if `@rel = "alternate"` (i.e. the referent is an alternate version of the resource). The value "related" simply denotes a generic relationship. The `atom:link` element applies to all child features in a container unless overridden.

d. References:

- OGC 12-007, 9.1.3.6
- The Atom Syndication Format - [The "atom:link" Element](#) (RFC 4287)

e. Test type: Capability

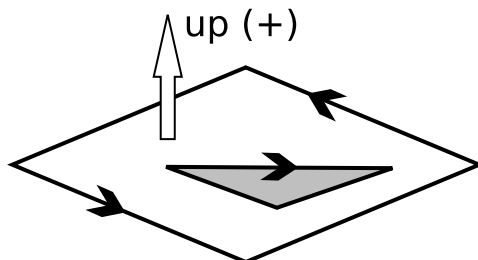
## Conformance Level 3

### Purpose

Includes all tests in Level 2 and introduces additional constraints that are essentially informative in nature; they are intended to signal the use of deprecated elements or to encourage alignment with existing (non-normative) geomatics standards or conventions.

### ATC-301: Polygon boundary orientation

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-301>
- b. Purpose: Confirm that the rings comprising the boundary of a `kml:Polygon` geometry satisfy the constraints listed below.
  1. no two rings cross (but they may intersect at a single point);
  2. the (exterior) coordinates are specified in a counterclockwise order.
- c. Method: Pass if all assertions are satisfied; fail otherwise. The surface of a polygon is oriented such that the interior is to the left of a boundary curve. This means that the exterior boundary of the surface runs counterclockwise when viewed from the side of the surface indicated by the upward normal (the "top" of the surface); interior boundaries are clockwise.



- d. References:
  - OGC 12-007, 10.8.2
  - KML Reference - [Polygon](#)
  - *Geographic information – Spatial schema* (ISO 19107), cl. 6.3.6: GM\_Ring
- e. Test type: Capability

### ATC-302: LinearRing is closed and simple

- a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-302>
- b. Purpose: Check that a `kml:LinearRing` is closed and simple; that is, it forms a cycle (first and last coordinates are identical) and it does not cross itself.
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.5.2



- KML Reference - [LinearRing](#)
  - *Geographic information – Spatial schema* (ISO 19107), cl. 6.3.6: GM\_Ring
- e. Test type: Capability

### **ATC-303: BalloonStyle with color (deprecated)**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-303`
- b. Purpose: Check for any occurrences of the (deprecated) `kml:color` element in `kml:BalloonStyle` elements.
- c. Method: Pass if no `kml:color` elements occur in this context; fail otherwise. This element is deprecated in favour of `kml:bgColor`.
- d. References:
  - OGC 12-007, 12.7.3.1
- e. Test type: Capability

### **ATC-304: Metadata element (deprecated)**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-304`
- b. Purpose: Check for any occurrences of the deprecated `kml:Metadata` element.
- c. Method: Pass if no `kml:Metadata` elements occur; fail otherwise. This element is deprecated in favour of `kml:ExtendedData`.
- d. References:
  - OGC 12-007, 9.2.2
- e. Test type: Capability

### **ATC-305: Model scale factors**

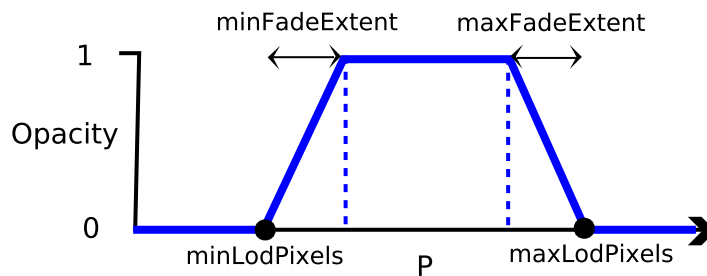
- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-305`
- b. Purpose: Verify that a `kml:Scale` element includes all of the following child elements: `kml:x`, `kml:y`, and `kml:z`
- c. Method: Pass if the assertion is satisfied; fail otherwise.
- d. References:
  - OGC 12-007, 10.12.2
- e. Test type: Capability

### **ATC-306: LOD fade range**

- a. Identifier: `http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-306`
- b. Purpose: Verify that the following expression holds for the pixel ramp values that determine whether or not a region is active:

```
kml:minFadeExtent + kml:maxFadeExtent <=
kml:maxLodPixels - kml:minLodPixels
```

- c. Method: Pass if the assertion is satisfied; fail otherwise. The fade range is depicted in the following figure.



d. References:

- OGC 12-007, 9.22.2
- OGC 12-007, 9.16.2
- KML Developer's Guide - Regions - [Fade Extent](#)

e. Test type: Capability

### ATC-307: Model orientation is fully specified

a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-307>

b. Purpose: Verify that a kml:Orientation element includes the following child elements: kml:heading, kml:tilt, and kml:roll.

c. Method: Pass if the assertion is satisfied; fail otherwise.

d. References:

- OGC 12-007, 10.11.2
- KML Reference - [Orientation](#)

e. Test type: Capability

### ATC-308: Snippet element (deprecated)

a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-308>

b. Purpose: Check for any occurrences of the deprecated kml:Snippet element.

c. Method: Pass if no kml:Snippet elements occur; fail otherwise. This element is deprecated in favour of kml:snippet.

d. References:

- OGC 12-007, 9.1.3.10

e. Test type: Capability

### ATC-309: Url element (deprecated)

a. Identifier: <http://www.opengis.net/spec/KML/2.3/conf/level-3/atc-309>

b. Purpose: Check for any occurrences of the deprecated kml:Url element.

c. Method: Pass if no kml:Url elements occur as a child of kml:NetworkLink; fail otherwise. This element is deprecated in favour of kml:Link.

d. References:

- OGC 12-007, 9.15.3.3

e. Test type: Capability