



**Specification**

**S-2019-001**

**Academy Color Encoding System Metadata File  
(AMF) Specification**

The Academy of Motion Picture Arts and Sciences

Science and Technology Council

Academy Color Encoding System (ACES) Project Committee

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**Summary:** The ACES Metadata File (“AMF”) is a ‘sidecar’ XML file intended to exchange the metadata required to recreate ACES viewing pipelines. This document specifies example use cases for AMF along with the data model and XML tags needed for implementation.

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**Revision History**

Version	Date	Description
1.0	11/25/2019	Initial Version

**Related Academy Documents**

Document Name	Description
S-2014-002	Academy Color Encoding System — Versioning System

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# 1 Scope

This document specifies the ACES Metadata File (“AMF”), a ‘sidecar’ XML file intended to exchange the metadata required to recreate ACES viewing pipelines.

This specification supersedes TB-2014-009 – Academy Color Encoding System (ACES) Clip-level Metadata File Format Definition and Usage (“ACESclip”). TB-2014-009 is now considered obsolete.

# 2 Introduction

The ACES Metadata File (“AMF”) is a ‘sidecar’ XML file intended to exchange the metadata required to recreate ACES viewing pipelines. It describes the transforms necessary to configure an ACES viewing pipeline for a collection of related image files.

Examples of such metadata:

- ACES Version
- Input Transform
- LMT(s) and Working Color Space of LMT(s)
- Output Transform

An AMF may be associated with a single frame or clip. Additionally, it may remain unassociated with an image, and existing purely as a translation of an ACES viewing pipeline that could be applied to any image.

Images are formed at several stages of production and post-production, including:

- Digital cameras
- Film scanners
- Animation and VFX production
- Virtual production
- Editorial and color correction systems

AMF can be compatible with any digital image, and is not restricted to those encoded in the ACES (SMPTE ST 2065-1). They may be camera native file formats or other encodings if they have associated Input Device Transforms (IDTs) so they may be displayed using an ACES viewing pipeline.

AMFs may also embed creative look adjustments as one or more LMTs (Look Modification Transforms). These looks may be in the form of ASC CDL values, or a reference to an external LUT file.

AMFs can serve as effective archival elements. When paired with finished ACES image files, they form a complete archival record of how image content is intended to be viewed.

AMFs do not contain “timeline” metadata such as edit points. Timeline management files such as Edit Decision Lists (EDLs) or Avid Log Exchange files (ALEs) may reference AMFs, attaching them to editing events and thus enable standardized color management throughout all stages of production.

Figure 1 shows the overall structure of an AMF in simplified form.

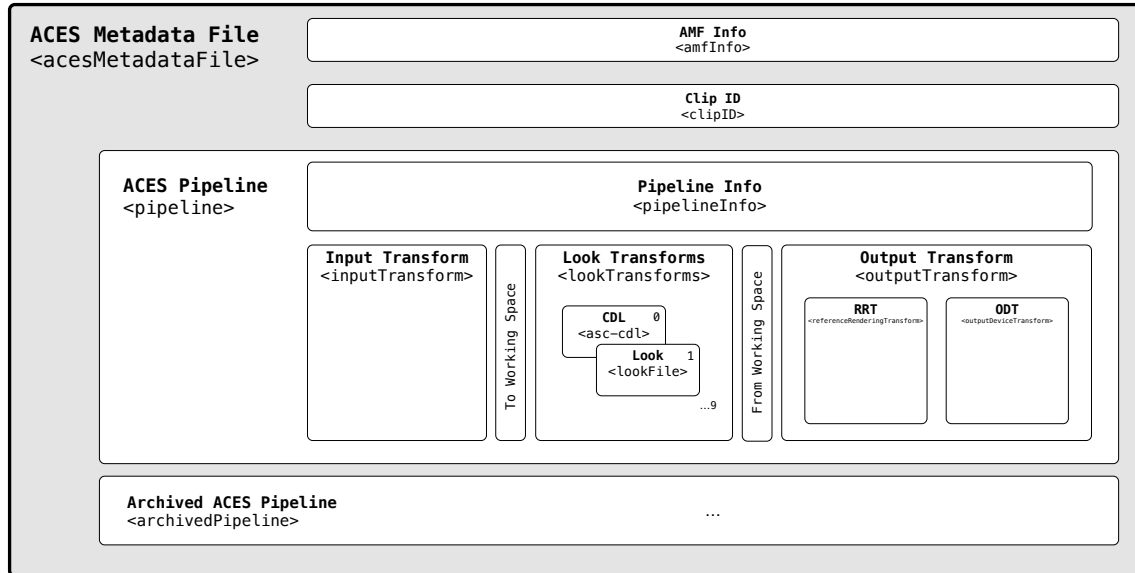


Figure 1 – A diagram showing the overall structure of an ACES Metadata File.

### 3 References

The following standards, specifications, articles, presentations, and texts are referenced in this text:

Academy S-2014-002, Academy Color Encoding System - Versioning System

SMPTE ST 2065-4:2013, ACES Image Container File Layout

ISO 8601:2004, Data elements and interchange formats – Information interchange – Representation of dates and times

ISO/IEC 11578:1996, Information technology – Open Systems Interconnection – Remote Procedure Call (RPC)

SMPTE ST.2067-50 – Interoperable Master Format — Application #5 ACES

SMPTE RDD 47 – Interoperable Master Format — Isochronous Stream of XML Documents (ISXD) Plugin

SMPTE ST.2067-9 – Interoperable Master Format — Sidecar Composition Map

### 4 Terms and Definitions

The following terms and definitions are used in this document.

#### 4.1 DateTime

(reference: ISO8601:2004) timestamp format

The DateTime is specified in the following form "YYYY-MM-DDThh:mm:ss{offset}" where:

- YYYY indicates the year
- MM indicates the month
- DD indicates the day
- T indicates the start of the required time section
- hh indicates the hour

- mm indicates the minute
- ss indicates the second
- {offset} time zone offset from UTC

NOTE: All components are required.

Example: 2014-11-20T12:24:13-8:00

#### 4.2 TransformID

String identifying the ACES transform. Please see the ACES System Versioning Specification for more information on the format to use for TransformIDs.

## 5 Use Cases

ACES Metadata Files (AMFs) are intended to contain the minimum required metadata for transferring information about ACES viewing pipelines during production, post-production, and archival.

Typical use cases for AMF files are the application of “show LUT” LMTs in cameras and on-set systems, the capture of shot-to-shot looks generated on-set using ASC-CDL, and communication of both to dailies, editorial, VFX, and post-production mastering facilities.

AMF supports the transfer of looks by embedding ASC-CDL values within the AMF file or by referencing sidecar look files containing LMTs, such as CLF (Common LUT Format) files. In cases where the looks are stored external to the AMF, the files must be assigned a valid ACES LMT TransformID.

In a practical sense, AMF can serve as the missing link between ACES 2065-1 encoded images and the question “*how do I view this?*”

### 5.1 Look Development

Developing a creative look prior to photography can be done to produce a pre-adjusted reference for on-set monitoring. This may happen in pre-production at a post facility, during camera testing, or on-set during production. Typically, this has involved meticulous communication of necessary files and their intention, which may include a viewing transform, CDL grades, or more. The viewing transform, commonly referred to as a “Show LUT,” can vary in naming convention, LUT format, input/output color space, and full/legal range scaling. Exchanging files in this way obfuscates the creative intention of their application, due to lack of metadata or standards surrounding their creation.

AMF can store a creative look in order to be shared with a production to automatically recreate the look for on-set monitoring. A common way to produce a creative look in an ACES workflow is the creation of an LMT (Look Modification Transform), which separates the look from the standard ACES transforms. Further, AMF can include references to multiple LMTs, while ensuring they are all applied in the correct order to the image.

AMF offers an unambiguous description of the full ACES viewing pipeline for on-set look management software to load and display images as intended.

### 5.2 On Set

Before production begins, an AMF may be created and shared with production as a “look template” for use during on-set monitoring or look management.

Cameras with AMF support can load or generate AMFs to configure or communicate the viewing pipeline of images viewed out of the camera’s live video signal.

On-set grading software with AMF support can load or generate AMFs based on the viewing pipeline selected and any creative look adjustments done by the DIT or DoP.

In addition to defining the viewing pipeline, the AMF also describes the LMT working space (e.g. ACEScct, ACEScc, etc) in which a creative look may be applied or adjusted as desired using CDLs or other controls.

### 5.3 Dailies

The AMF (or collection of AMFs) from on-set should be shared with dailies in order to be applied to the OCF (original camera files) and generate proxies or other dailies deliverables. Methodologies of exchange between on-set and dailies may vary, sometimes being done using ALE or EDLs depending on the workflow preferences of the project.

It is possible, or even likely, that AMFs are updated in the dailies stage. For example, a dailies colorist may choose to balance shots at this stage and update CDLs or LMTs. Another example could be that on-set monitoring was done using an HDR ODT and dailies is generating proxies using an SDR ODT.

It may be that AMFs are tracked the same way that CDLs and LUTs are tracked today (such as ALE or EDL), until more robust methods exist such as embedding metadata in the various formats used.

### 5.4 VFX

A powerful use case of AMF is the complete and unambiguous communication of the ACES viewing pipelines or 'color recipe' of shots being sent out for VFX work.

As with on-set, this is commonly done in a bespoke manner with combinations of CDLs and LUTs in various file formats in order for VFX facilities to be able to recreate the look seen in dailies and editorial.

AMFs should be sent alongside outgoing VFX plates and describe how to view the shot along with any creative look that it associated with the shot (CDL or LUT).

VFX software should have the ability to read AMF as a template for configuring its internal viewing pipeline. Given the prevalence of OpenColorIO in the VFX software space, it is likely that AMF will inform choices of OCIO configuration in order to replicate the ACES viewing pipeline described in the AMF.

### 5.5 Finishing

In finishing, the on-set or dailies viewing reference can be automatically recreated upon reading an AMF. This stage typically uses a higher quality display, which may warrant the use of a different ACES ODT than one specified in an ingested AMF.

This would give the colorist or artist a starting point which is representative of the creative intent of the filmmakers thus far, at which point they may focus their time on new creative avenues, rather than spending time trying to recreate prior work done.

### 5.6 Archival

AMF enables the ability to establish a complete ACES archive, and effectively serves as a snapshot of creative intent for preservation and remastering purposes. All components required to recreate the look of an ACES archive are meaningfully described and preserved within the AMF.

One possible method for this could be the utilization of SMPTE standards such as ST.2067-50 (IMF App #5) – commonly referred to as “ACES IMF” – and SMPTE RDD 47 (ISXD) – a virtual track file containing XML data – in order to form a complete and flexible ACES archival package.

Another method could be to use SMPTE ST.2067-9 (Sidecar Composition Map) which would allow you to link a single AMF to a CPL (Composition Playlist) in the case where there is a single AMF for an entire playlist.

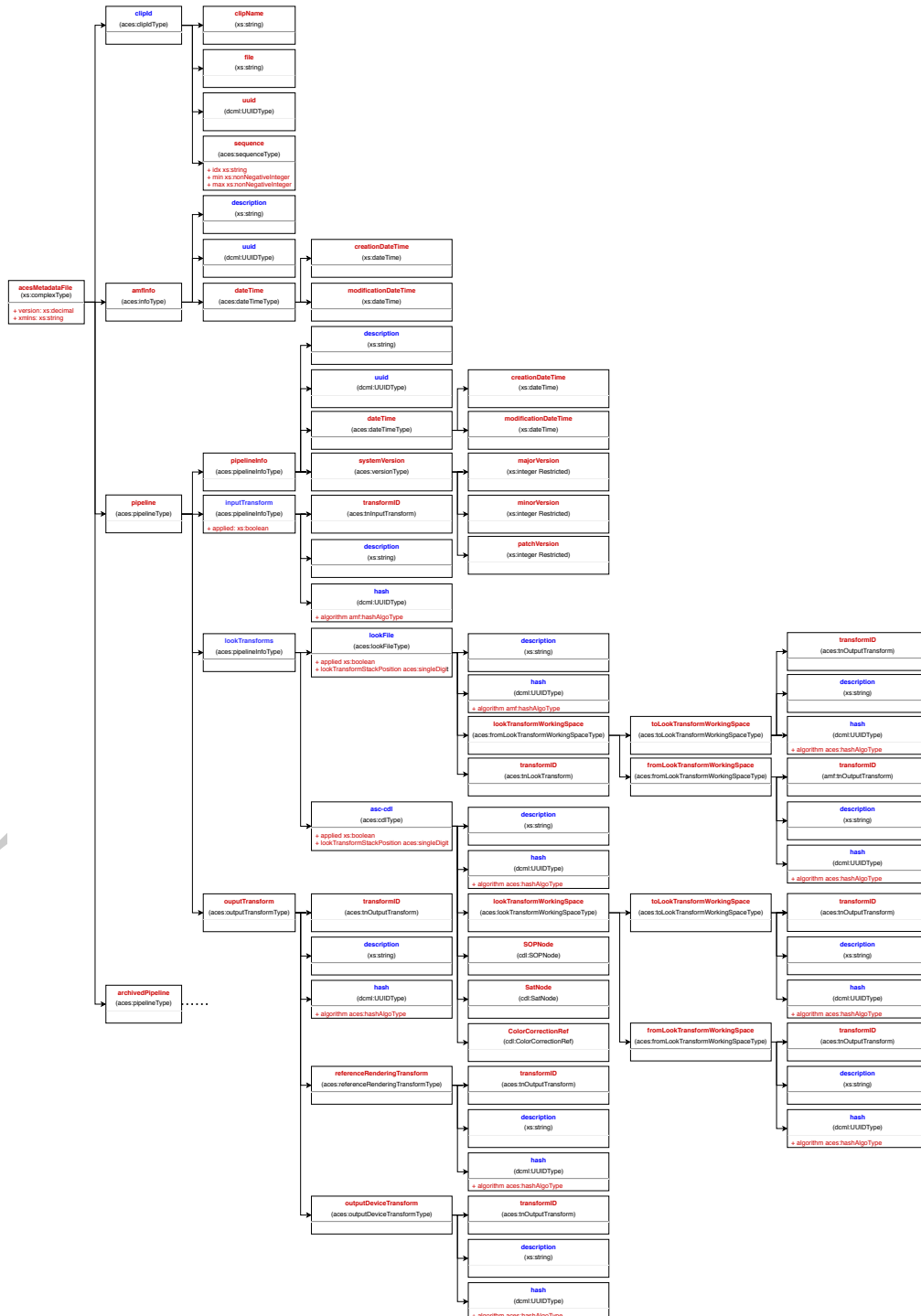


# 6 Data Model

This section describes the data intended for use within the ACES Metadata file.

All top level structures shall be tagged as being within the `aces` namespace with `urn:acesMetadata:acesMetadataFile:v1.0`

## 6.1 UML Diagram



## 6.2 Types

The following types are defined for use within the AMF XML file and are validated with the XSD schema included in Appendix A. The types are used as the basis to form the elements listed in section X in the schema.

### 6.2.1 Simple Types

#### 6.2.1.1 `aces:singleDigitType`

**Description:**

Type defining a single digit integer

**Base Type:**

restriction of `xs:integer`

**Restrictions:**

```
xs:totalDigits value="1"
xs:minInclusive value="0"
xs:maxInclusive value="9"
```

#### 6.2.1.2 `aces:tnToLookTransformWorkingSpace`

**Description:**

Type defining valid transformID strings for `toLookTransformWorkingSpace` transforms

**Base Type:**

restriction of `xs:string`

**Restrictions:**

```
xs:pattern value="(ACEScsc\.\S +\.\a\d {1}\.\d {1}\.\d {1})"
```

#### 6.2.1.3 `aces:tnInputTransform`

**Description:**

Type defining valid transformID strings for `InputTransform` transforms

**Base Type:**

restriction of `xs:string`

**Restrictions:**

```
xs:pattern value="(IDT\.\S +\.\a\S +\.\v\S +)"
```

**6.2.1.4 aces:tnLookTransform****Description:**

Type defining valid transformID strings for LookFile transforms

**Base Type:**

restriction of xs:string

**Restrictions:**

```
xs:pattern value="(LMT\\.\\S +\\.a\\d {1}\\v\\d +) |
(LMT\\.Academy\\.\\S +\\.a\\d {1}\\d {1}\\d {1}) "
```

**6.2.1.5 aces:tnFromLookTransformWorkingSpace****Description:**

Type defining valid transformID strings for fromLookTransformWorkingSpace transforms

**Base Type:**

restriction of xs:string

**Restrictions:**

```
xs:pattern value="(ACEScsc\\.\\S +\\.a\\S +\\.\\S +\\.\\S +)" "
```

**6.2.1.6 aces:tnOutputDeviceTransform****Description:**

Type defining valid transformID strings for OutputDeviceTransform transforms

**Base Type:**

restriction of xs:string

**Restrictions:**

```
xs:pattern value="(ODT\\.\\S +\\.\\S +\\.a\\d {1}\\v\\d +) |
(ODT\\.Academy\\.\\S +\\.a\\d {1}\\d {1}\\d {1}) "
```

**6.2.1.7 aces:tnOutputTransform****Description:**

Type defining valid transformID strings for OutputTransform transforms

**Base Type:**

restriction of xs:string

**Restrictions:**

```
xs:pattern value="(RRTODT\\.\\S +\\.\\S +\\.a\\d {1}\\v\\d +) |
(RRTODT\\.Academy\\.\\S +\\.a\\d {1}\\d {1}\\d {1}) "
```

**6.2.1.8 aces:tnReferenceRenderingTransform****Description:**

Type defining valid transformID strings for OutputTransform transforms

**Base Type:**

restriction of xs:string

**Restrictions:**

```
xs:pattern value="(RRT\.a\d {1}\.\d \.\d +)"
```

**6.2.1.9 aces:hashAlgoType****Description:**

Type defining valid hash algorithms that can be used to validate specified transforms

**Base Type:**

restriction of xs:string

**Restrictions:**

```
xs:enumeration value="sha256"
xs:enumeration value="sha1"
xs:enumeration value="md5"
```

**6.2.2 Complex Types****6.2.2.1 aces:pipelineType****Description:**

Type defining a sequence of elements used to communicate an ACES viewing pipeline

**Children:**

```
aces:inputTransform, aces:lookTransforms, aces:outputTransform,
aces:pipelineInfo
```

**6.2.2.2 aces:toLookTransformWorkingSpaceType****Description:**

Type defining elements used to communicate the transform used to convert from ACES 2065-1 to the working color space associated with a particular look transform.

**Type:**

extension of aces:transformType

**Children:**

```
aces:description, aces:hash, aces:transformId
```

### 6.2.2.3 `aces:systemVersionType`

**Description:**

Type defining elements used to communicate ACES version information.

**Children:**

`aces:majorVersion`, `aces:minorVersion`, `aces:patchVersion`

### 6.2.2.4 `aces:cdlType`

**Description:**

Type defining elements used to contain or reference a set of ASC-CDL values.

**Type:**

extension of `aces:lookTransformType`

**Children:**

`aces:description`, `aces:hash`, `aces:lookTransformWorkingSpace`,  
`cdl:ColorCorrectionRef`, `cdl:SOPNode`, `cdl:SatNode`

### 6.2.2.5 `aces:clipIdType`

**Description:**

Type defining elements used to communicate information about the essence associated with the AMF

**Children:**

`aces:clipName`, `aces:file`, `aces:sequence`

### 6.2.2.6 `aces:dateTimeType`

**Description:** Type defining the elements to communicate information about the creation and modification date and time associated with various AMF elements.

**Children:**

`aces:creationDateTime`, `aces:modificationDateTime`

### 6.2.2.7 `aces:hashType`

**Description:** Type defining the element to communicate information about a cryptographic file hash associated with file referenced by the AMF.

**Type:**

extension of `xs:string`

**Children:**

`aces:hashAlgoType`

### 6.2.2.8 `aces:infoType`

**Description:** Type defining the elements to communicate description, date and time, and UUID information.

**Children:**

`aces:dateTime`, `aces:description`, `aces:uuid`

### 6.2.2.9 `aces:inputTransformType`

**Description:** Type defining the elements to communicate information about an ACES Input Transform associated with an ACES viewing pipeline.

**Type:**

extension of `aces:transformType`

**Children:**

`aces:description`, `aces:hash`, `aces:transformId`

### 6.2.2.10 `aces:lookFileType`

**Description:** Type defining the elements to communicate information about an ACES Look Transform associated with an ACES viewing pipeline and contained in a referenced file.

**Type:**

extension of `aces:lookTransformType`

**Children:**

`aces:description`, `aces:hash`, `aces:lookTransformWorkingSpace`,  
`aces:transformId`

**6.2.2.11** `aces:lookTransformType`

**Description:** Type defining the elements to communicate information about an ACES Look Transform associated with an ACES viewing pipeline.

**Type:**

extension of `aces:transformType`

**Children:**

`aces:description`, `aces:hash`, `aces:lookTransformWorkingSpace`

**6.2.2.12** `aces:fromLookTransformWorkingSpace`**Description:**

Type defining elements used to communicate the transform used to convert from the working color space associated with a particular look transform to ACES 2065-1.

**Type:**

extension of `aces:transformType`

**Children:**

`aces:description`, `aces:hash`, `aces:transformId`

**6.2.2.13** `aces:lookTransformWorkingSpaceType`**Description:**

Type defining elements used to communicate the transform used to convert to and from the working color space associated with a particular look transform.

**Children:**

`aces:toLookTransformWorkingSpace`, `aces:fromLookTransformWorkingSpace`

**6.2.2.14** `aces:lookTransformsType`**Description:**

Type defining elements used to communicate the ACES Look Transforms associated with an ACES viewing pipeline.

**Children:**

`aces:asc-cdl`, `aces:lookFile`

**6.2.2.15** `aces:outputDeviceTransformType`**Description:**

Type defining elements used to communicate the ACES Output Device Transform associated with an ACES viewing pipeline.

**Type:**

extension of `aces:transformType`

**Children:**

`aces:description`, `aces:hash`, `aces:transformId`

**6.2.2.16** `aces:outputTransformType`**Description:**

Type defining elements used to communicate the ACES Output Transform associated with an ACES viewing pipeline. The output transform can either be a single transform referenced by its `transformID` or the Reference Rendering Transform (RRT) and Output Device Transform (ODT) each referenced by their own `transformIDs`.

**Type:**

extension of `aces:transformType`

**Children:**

`aces:description`, `aces:hash`, `aces:outputDeviceTransform`,  
`aces:referenceRenderingTransform`, `aces:transformId`

**6.2.2.17** `aces:pipelineInfoType`**Description:**

Type defining the elements to communicate description, date and time, UUID information, and ACES version information.

**Type:**

extension of `aces:infoType`

**Children:**

`aces:acesVersion`, `aces:dateTime`, `aces:description`, `aces:uuid`



**6.2.2.18 aces:referenceRenderingTransformType****Description:**

Type defining elements used to communicate the ACES Reference Rendering Transform associated with an ACES viewing pipeline.

**Type:**

extension of `aces:transformType`

**Children:**

`aces:description`, `aces:hash`, `aces:transformId`

**6.2.2.19 aces:sequenceType****Description:**

Type defining elements used to communicate information about a file sequence associated with an AMF.

**Type:**

extension of `xs:string`

**6.2.2.20 aces:transformType****Description:**

Type defining elements used to communicate information about ACES transforms. This type is used as the basis for other complex types.

**Children:**

`aces:description`, `aces:hash`

## 6.3 Elements

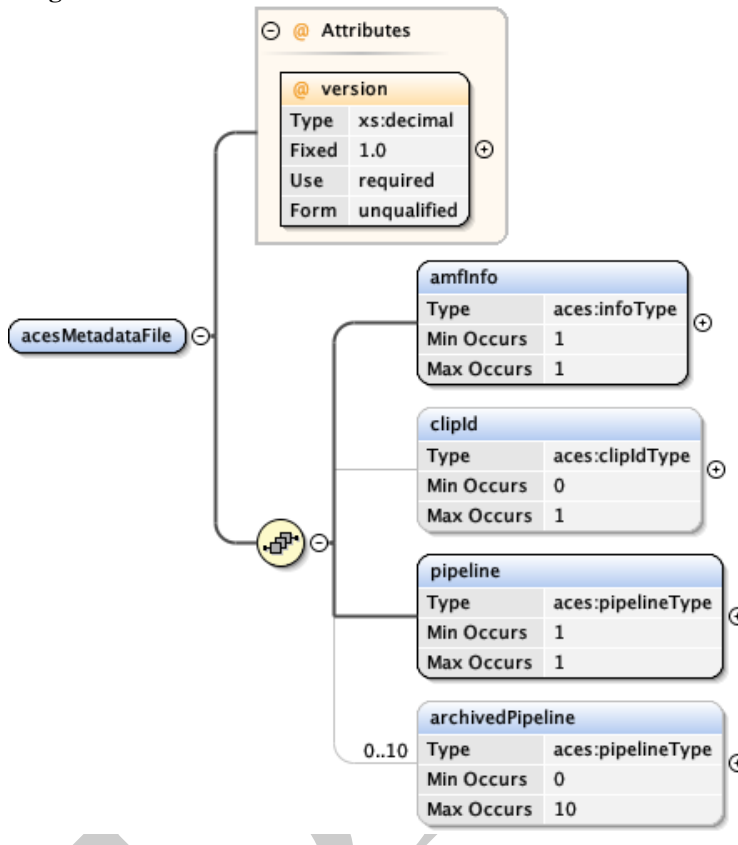
The following elements are defined for use with the AMF XML file and are validated with the XSD schema included in Appendix A.

### 6.3.1 `aces:acesMetadataFile`

**Description:**

The top level element of an ACES Metadata File. This element defines first level child elements.

**Diagram:**



**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: `version` (`xs:decimal`)

Optional: none

**Parent:**

None

**Children:**

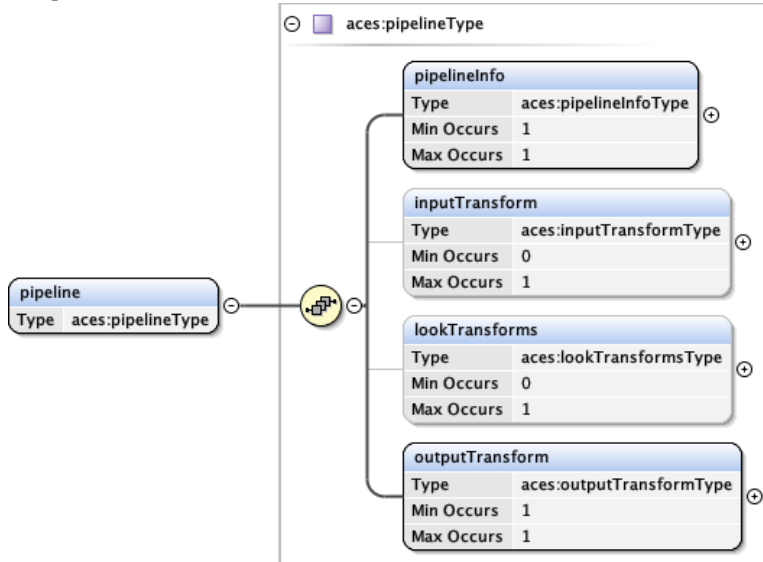
`aces:pipeline`, `aces:archivedPipeline`, `aces:clipId`, `aces:amfInfo`

### 6.3.2 `aces:pipeline`

**Description:**

This element contains all the elements describing the ACES viewing pipeline.

**Diagram:**



**Type:**

`aces:pipelineType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:acesMetadataFile`

**Children:**

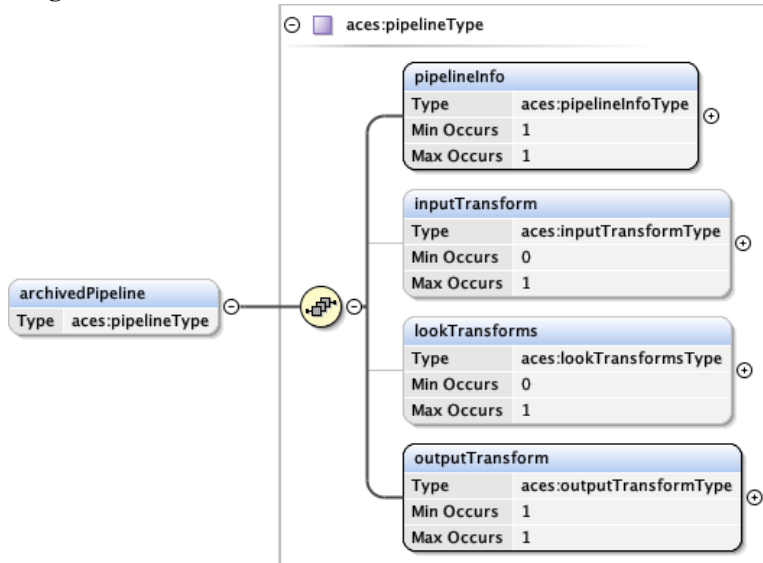
`aces:inputTransform`, `aces:lookTransforms`, `aces:outputTransform`,  
`aces:pipelineInfo`

### 6.3.3 `aces:archivedPipeline`

#### Description:

This element contains all the elements describing an ACES viewing pipeline archived for historical purposes.

#### Diagram:



#### Type:

`aces:pipelineType`

#### Required or Optional:

Optional

#### Occurrences:

Min : 0 Max : 10

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:acesMetadataFile`

#### Children:

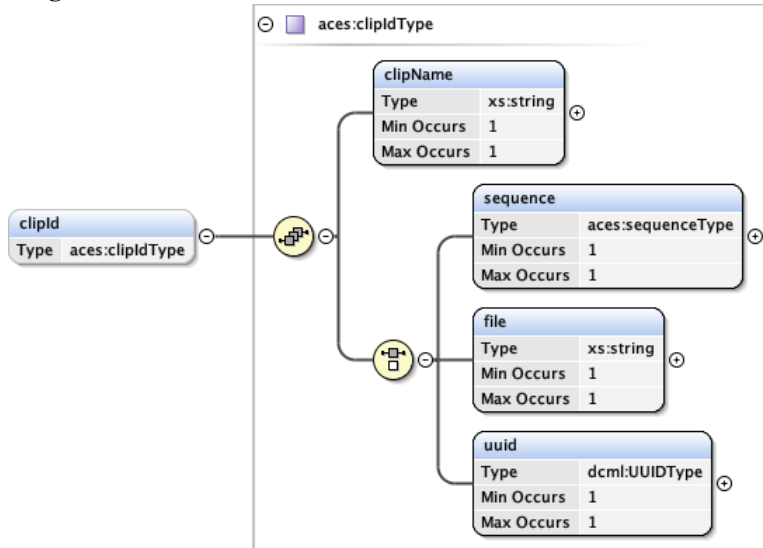
`aces:inputTransform`, `aces:lookTransforms`, `aces:outputTransform`,  
`aces:pipelineInfo`

### 6.3.4 `aces:clipId`

#### Description:

This optional element contains all the elements describing the location of the essence associated with the AMF.

#### Diagram:



#### Type:

`aces:clipIdType`

#### Required or Optional:

Optional

#### Occurrences:

Min : 0 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:acesMetadataFile`

#### Children:

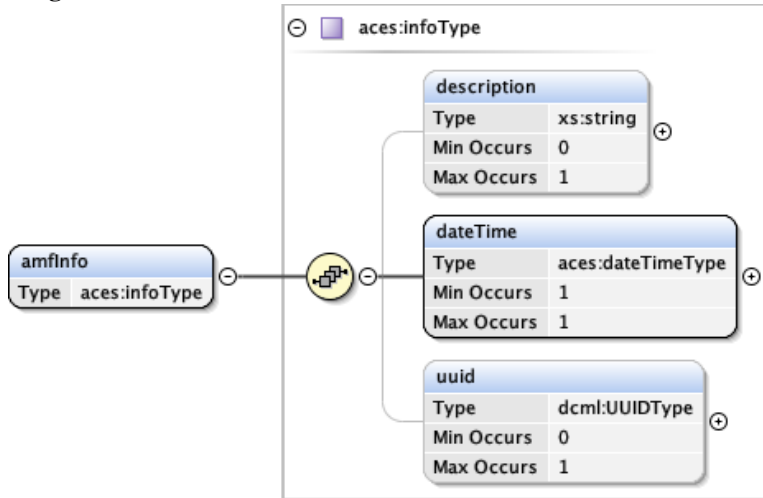
`aces:clipName`, `aces:file`, `aces:uuid`, `aces:sequence`

### 6.3.5 `aces:amfInfo`

**Description:**

This element contains all the elements containing information about the AMF itself including date and time information, a description element, and a UUID element.

**Diagram:**



**Type:**

`aces:infoType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:acesMetadataFile`

**Children:**

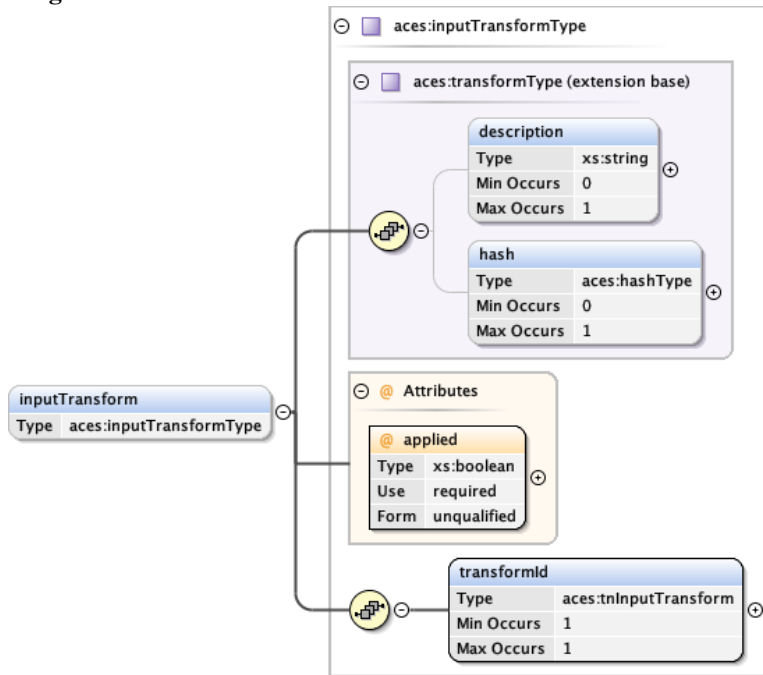
`aces:dateTime`, `aces:description`, `aces:uuid`

### 6.3.6 `aces:inputTransform`

#### Description:

This element contains all the elements containing information about the ACES input transform for a given ACES viewing pipeline. The required `applied` attribute is used to indicate if the ACES input transform indicated has been applied to the essence or not. If `applied="true"` the essence shall be encoded as according to SMPTE ST 2065-1. If `applied="false"` the essence may be transcoded to ACES using the transform indicated the child element. `transformId`.

#### Diagram:



#### Type:

`aces:inputTransformType`

#### Required or Optional:

Optional

#### Occurrences:

Min : 0 Max : 1

#### Attributes:

Required: `applied` (`xs:boolean`)

Optional: none

#### Parent:

`aces:pipeline`, `aces:archivedPipeline`

#### Children:

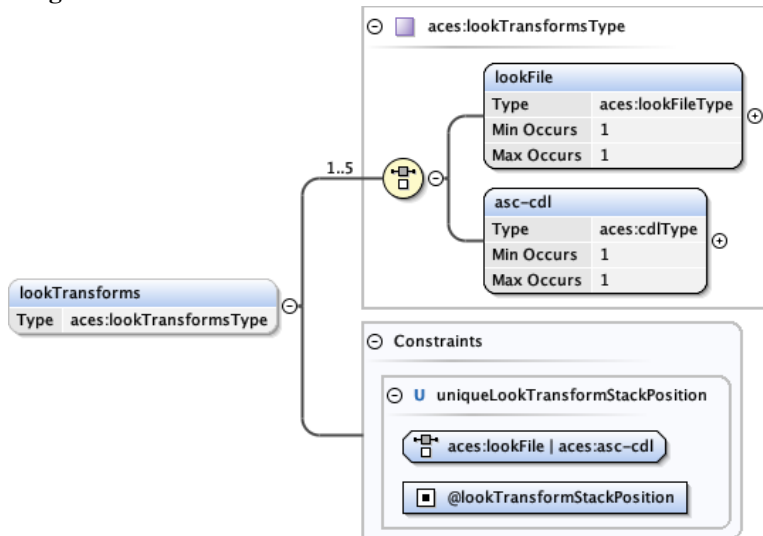
`aces:description`, `aces:hash`, `aces:transformId`

### 6.3.7 `aces:lookTransforms`

#### Description:

This element contains all the elements containing information about the ACES look transforms for a given ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:lookTransformsType`

#### Required or Optional:

Optional

#### Occurrences:

Min : 0 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:pipeline`, `aces:archivedPipeline`

#### Children:

`aces:asc-cdl`, `aces:lookFile`

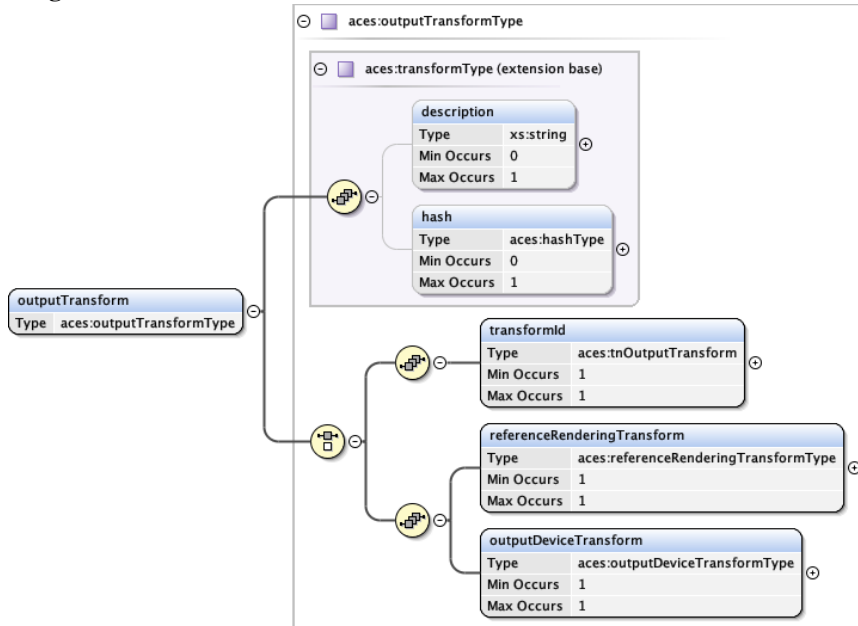


### 6.3.8 `aces:outputTransform`

#### Description:

This element contains all the elements containing information about the ACES output transform for a given ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:outputTransformType`

#### Required or Optional:

Required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:pipeline`, `aces:archivedPipeline`

#### Children:

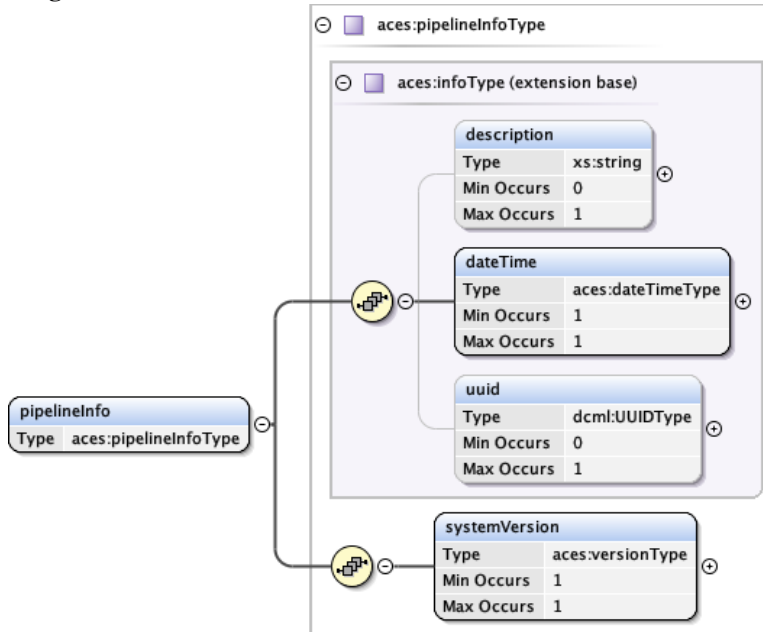
`aces:description`, `aces:hash`, `aces:outputDeviceTransform`,  
`aces:referenceRenderingTransform`, `aces:transformId`

### 6.3.9 `aces:pipelineInfo`

#### Description:

This element contains all the elements containing information such a description, date and time information, a UUID and the ACES version number for an ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:pipelineInfoType`

#### Required or Optional:

Required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:pipeline`, `aces:archivedPipeline`

#### Children:

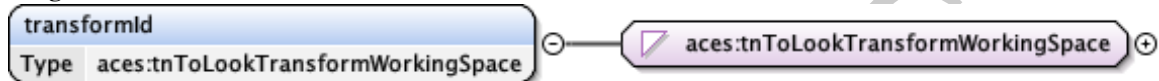
`aces:systemVersion`, `aces:dateTime`, `aces:description`, `aces:uuid`

### 6.3.10 `aces:toLookTransformWorkingSpaceType` / `aces:transformId`

#### Description:

This element is used to communicate the transformID of the ACES 2065-1 to working color space transform for the application of a look transform. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Color Space Conversion (CSC) transforms. The element is restricted to enforce the use of transformIDs that follow the CSC naming conventions established in the versioning system specification. As noted in the versioning system specification, manufacturer and user created transforms shall be assigned a transformID according to patterns established in the document.

#### Diagram:



#### Type:

`aces:tnToLookTransformWorkingSpace`

#### Required or Optional:

Required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:lookTransformWorkingSpace`

#### Children:

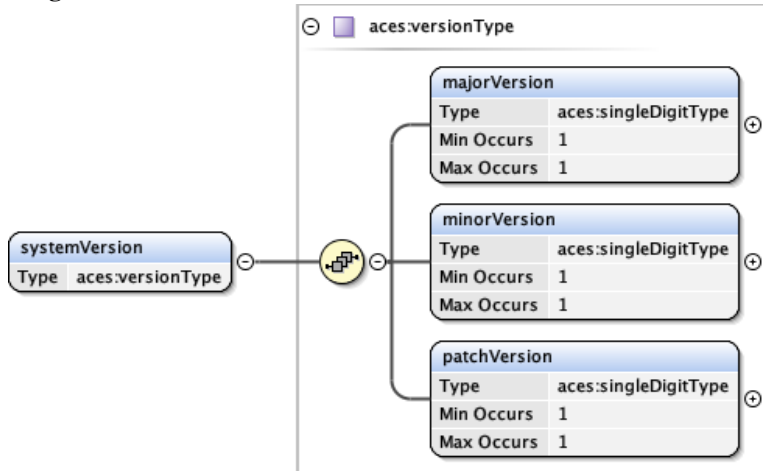
None

### 6.3.11 `aces:systemVersion`

**Description:**

This element contains all the elements containing information about the ACES version number associated with the ACES viewing pipeline.

**Diagram:**



**Type:**

`aces:versionType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:pipelineInfo`

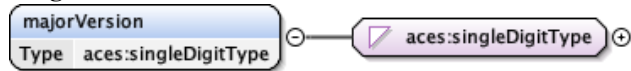
**Children:**

`aces:majorVersion`, `aces:minorVersion`, `aces:patchVersion`

### 6.3.12 `aces:majorVersion`

**Description:**

This element contains information on the ACES system major version number associated with an ACES viewing pipeline.

**Diagram:****Type:**

`aces:singleDigitType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:systemVersion`

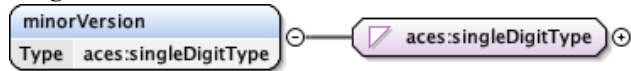
**Children:**

None

### 6.3.13 `aces:minorVersion`

**Description:**

This element contains information on the ACES system minor version number associated with an ACES viewing pipeline.

**Diagram:****Type:**

`aces:singleDigitType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:systemVersion`

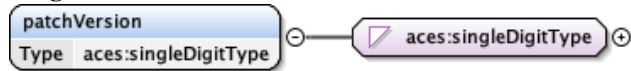
**Children:**

None

### 6.3.14 `aces:patchVersion`

**Description:**

This element contains information on the ACES system patch version number associated with an ACES viewing pipeline.

**Diagram:****Type:**

`aces:singleDigitType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:systemVersion`

**Children:**

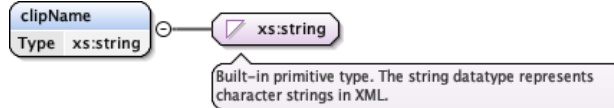
None

DRAFT

### 6.3.15 `aces:clipName`

**Description:**

This element is used to communicate the clip name associated with the essence.

**Diagram:****Type:**

`xs:string`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:clipId`

**Children:**

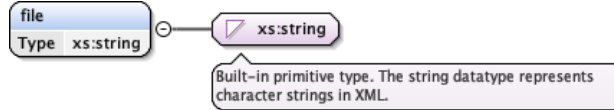
None



### 6.3.16 `aces:file`

**Description:**

This element is used to communicate the file containing the essence.

**Diagram:****Type:**

`xs:string`

**Required or Optional:**

Choice of `aces:file`, `aces:seequence` or `aces:uuid` is required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:clipId`

**Children:**

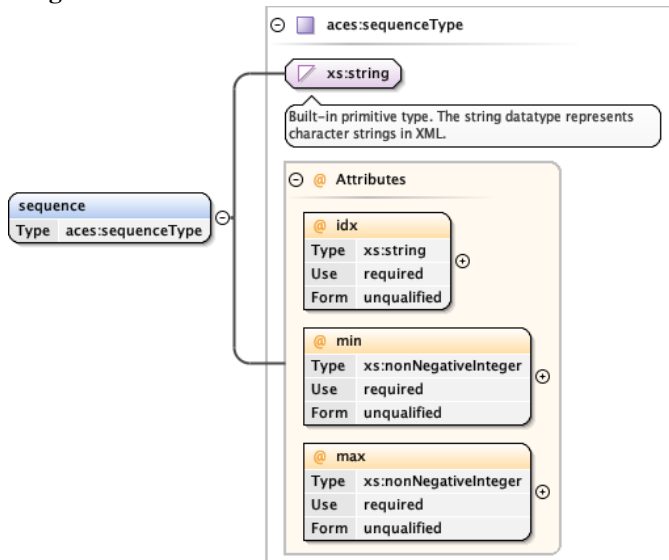
None

### 6.3.17 `aces:sequence`

#### Description:

This element is used to communicate the file sequence information associated with the essence. The file sequence includes an index indicated by the `idx` attribute (e.g. #) that is used to denote the location of frame numbers within the sequence string. The `min` and `max` attributes are used to indicate the minimum frame number and maximum frame number of the sequence. For example, if the sequence string is `movieFrame####.exr` and attributes of `aces:sequence` are `idx='#'`, `min='0'` and `max='1000'` the essence associated with the AMF would be the frames numbered `movieFrame0000.exr` through `movieFrame1000.exr`

#### Diagram:



#### Type:

`aces:sequenceType`

#### Required or Optional:

Choice of `aces:file`, `aces:sequence` or `aces:uuid` is required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: `idx`, `min`, `max`

Optional: none

#### Parent:

`aces:clipId`

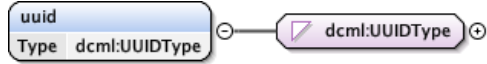
#### Children:

None

### 6.3.18 `aces:clipIdType` / `aces:uuid`

**Description:**

This element is used to communicate a UUID associated with the essence referred to in the ClipID.

**Diagram:****Type:**

`dcml:UUIDType`

**Required or Optional:**

Choice of `aces:file`, `aces:sequence` or `aces:uuid` is required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:amfInfo`, `aces:pipelineInfo`, `aces:clipId`

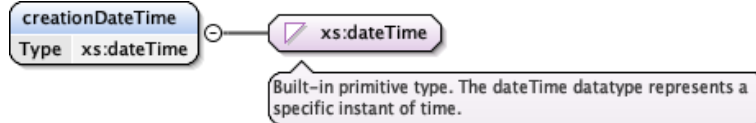
**Children:**

None

### 6.3.19 `aces:creationDateTime`

**Description:**

This element is used to communicate the creation date and time of an AMF file or an ACES pipeline.

**Diagram:****Type:**

`xs:dateTime`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:dateTime`

**Children:**

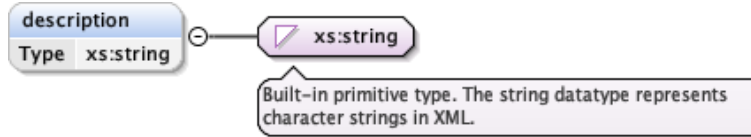
None

### 6.3.20 `aces:description`

**Description:**

This element is used to communicate description information for an AMF file, an ACES pipeline, or various ACES viewing transforms.

**Diagram:**



**Type:**

`xs:string`

**Required or Optional:**

Optional

**Occurrences:**

Min : 0 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:amfInfo`, `aces:pipelineInfo`, `aces:toLookTransformWorkingSpace`,  
`aces:fromLookTransformWorkingSpace`, `aces:inputTransform`,  
`aces:lookFile`, `aces:asc-cdl`, `aces:outputTransform`,  
`aces:outputDeviceTransform`, `aces:referenceRenderingTransform`

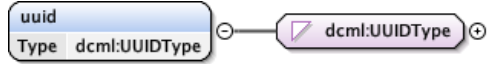
**Children:**

None

### 6.3.21 `aces:infoType` / `aces:uuid`

**Description:**

This element is used to communicate a UUID of an AMF file, an ACES pipeline.

**Diagram:****Type:**

`dcml:UUIDType`

**Required or Optional:**

Optional

**Occurrences:**

Min : 0 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:amfInfo`, `aces:pipelineInfo`, `aces:clipId`

**Children:**

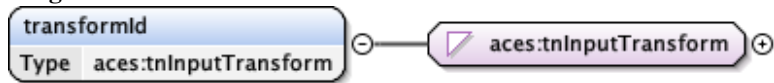
None

### 6.3.22 `aces:inputTransformType` / `aces:transformId`

#### Description:

This element is used to communicate the transformID of an ACES Input Transform that transforms images encoded in a color space of a camera native file to ACES 2065-1. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Input Transforms. The element is restricted to enforce the use of transformIDs that follow the IDT naming conventions established in the versioning system specification. As noted in the versioning system specification, manufacturer and user created transforms shall be assigned a transformID according to patterns established in the document.

#### Diagram:



#### Type:

`aces:tnInputTransform`

#### Required or Optional:

Required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:inputTransform`

#### Children:

None

### 6.3.23 `aces:lookFileType` / `aces:transformId`

#### Description:

This element is used to communicate the transformID of an ACES Look Transform. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Look Transforms (LMT). The element is restricted to enforce the use of transformIDs that follow the LMT naming conventions established in the versioning system specification. As noted in the versioning system specification, manufacturer and user created transforms shall be assigned a transformID according to patterns established in the document.

#### Diagram:



#### Type:

`aces:tnLookTransform`

#### Required or Optional:

Required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:lookFile`

#### Children:

None

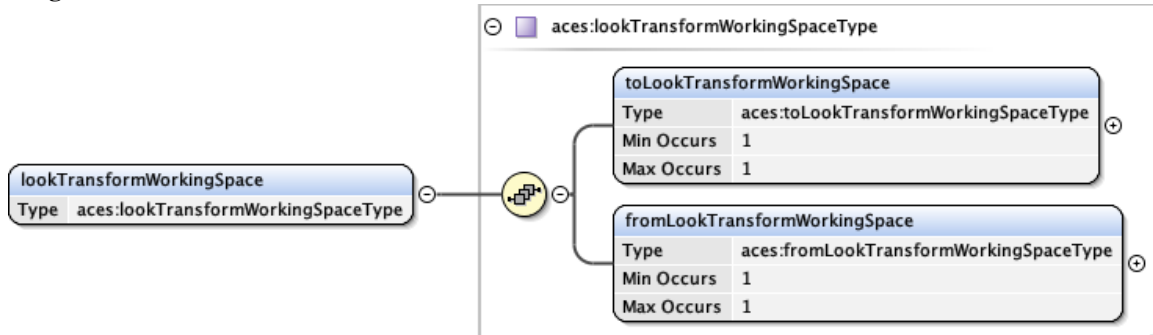


### 6.3.24 `aces:lookTransformWorkingSpace`

**Description:**

This element contains all the elements describing the transforms used to convert to and from the working color space in which a look transform is applied.

**Diagram:**



**Type:**

`aces:lookTransformWorkingSpaceType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

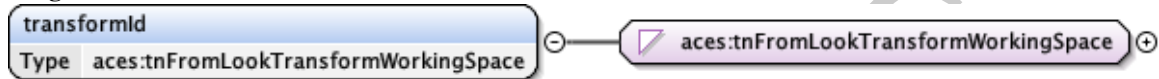
`aces:lookFile`, `aces:asc-cdl`

**Children:**

`aces:toLookTransformWorkingSpace`, `aces:fromLookTransformWorkingSpace`

**6.3.25** `aces:fromLookTransformWorkingSpaceType` / `aces:transformId`**Description:**

This element is used to communicate the transformID of the working color space to ACES 2065-1 transform for the application of a look transform. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Color Space Conversion (CSC) transforms. The element is restricted to enforce the use of transformIDs that follow the CSC naming conventions established in the versioning system specification. As noted in the versioning system specification, manufacturer and user created transforms shall be assigned a transformID according to patterns established in the document.

**Diagram:****Type:**

`aces:tnLookTransformWorkingSpace`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:lookTransformWorkingSpace`

**Children:**

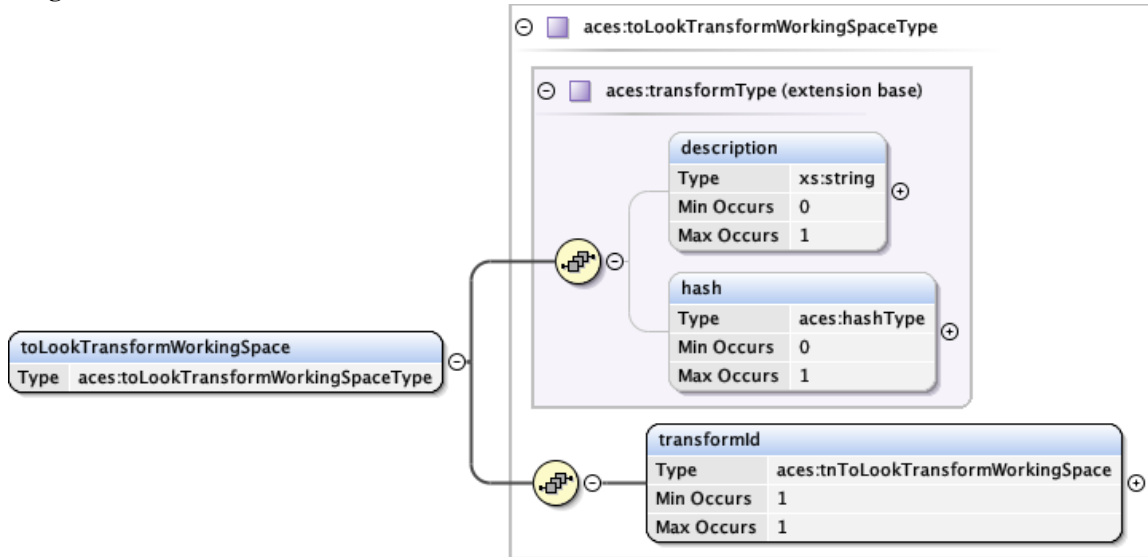
None

### 6.3.26 `aces:toLookTransformWorkingSpace`

**Description:**

This element contains all the elements describing the transform used to convert from ACES 2065-1 to the working color space in which a look transform is applied.

**Diagram:**



**Type:**

`aces:toLookTransformWorkingSpaceType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:lookTransformWorkingSpace`

**Children:**

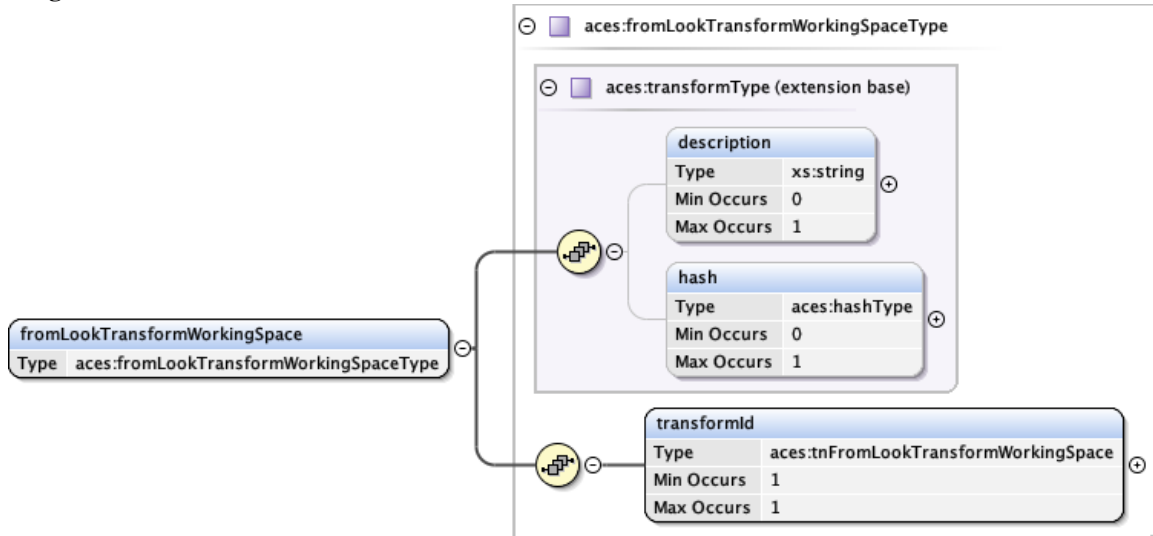
`aces:description`, `aces:hash`, `aces:transformId`

### 6.3.27 `aces:fromLookTransformWorkingSpace`

**Description:**

This element contains all the elements describing the transform used to convert from the working color space in which a look transform is applied to ACES 2065-1.

**Diagram:**



**Type:**

`aces:fromLookTransformWorkingSpaceType`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:lookTransformWorkingSpace`

**Children:**

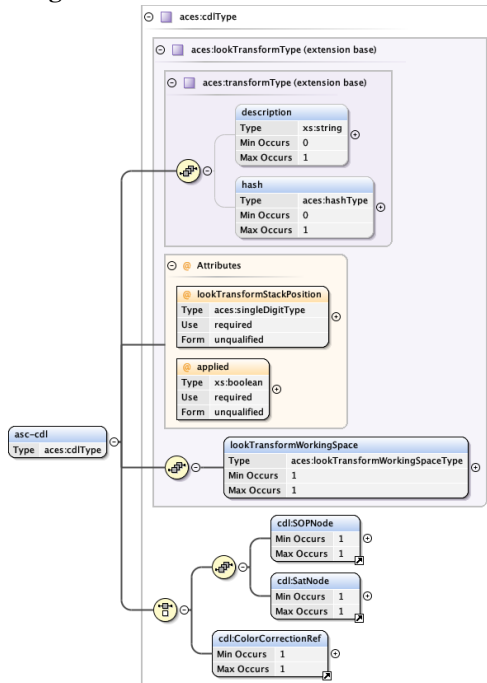
`aces:description`, `aces:hash`, `aces:transformId`

### 6.3.28 `aces:asc-cdl`

#### Description:

This element contains all the elements describing an ASC-CDL transform used as an ACES Look Transform. Look transforms elements shall be applied in the order specified by the required attribute `lookTransformStackPosition` where the Look Transform with the smallest value of `lookTransformStackPosition` is applied first. The required `applied` attribute is used to indicate if the Look Transform has been applied to the essence or not. `applied="true"` indicates the Look Transform has already been applied to the essence (i.e. the Look Transform has been "baked" into the essence) and shall not be applied as part of the ACES viewing transform. `applied="false"` indicates the Look Transform has not been applied to the essence and shall be applied as part of the ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:cdlType`

#### Required or Optional:

Choice of `aces:asc-cdl` or `aces:lookFile` required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: `lookTransformStackPosition`, `applied`  
Optional: none

#### Parent:

`aces:lookTransform`

#### Children:

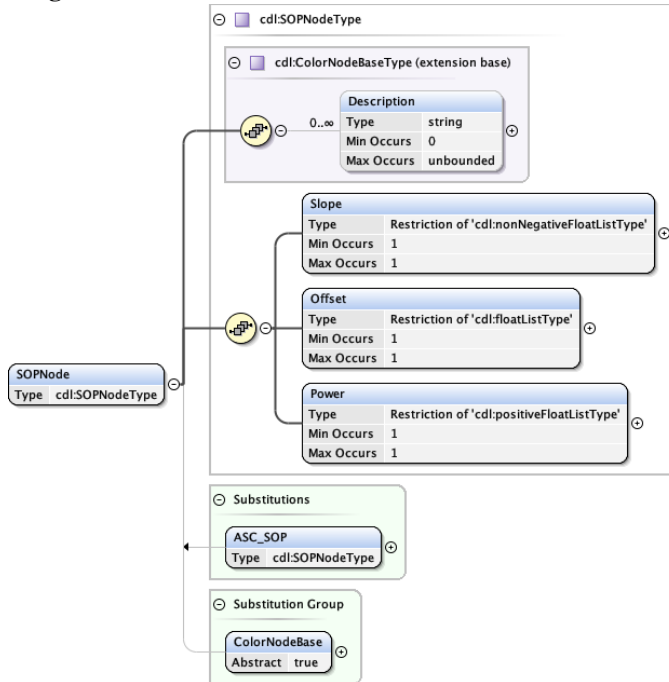
`aces:description`, `aces:hash`, `aces:lookTransformWorkingSpace`,  
`cdl:ColorCorrectionRef`, `cdl:SOPNode`, `cdl:SatNode`

### 6.3.29 cdl:SOPNode

#### Description:

This element is imported from the ASC-CDL schema (ASC-CDL\_schema.v1.01.xsd). It defines a Slope, Offset, Power node. See the ASC-CDL documentation for more information on its usage.

#### Diagram:



#### Type:

cdl:SOPNodeType

#### Required or Optional:

Choice of cdl:SOPNode and cdl:SatNode or cdl:ColorCorrectionRef required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none Optional: none

#### Parent:

aces:asc-cdl

#### Children:

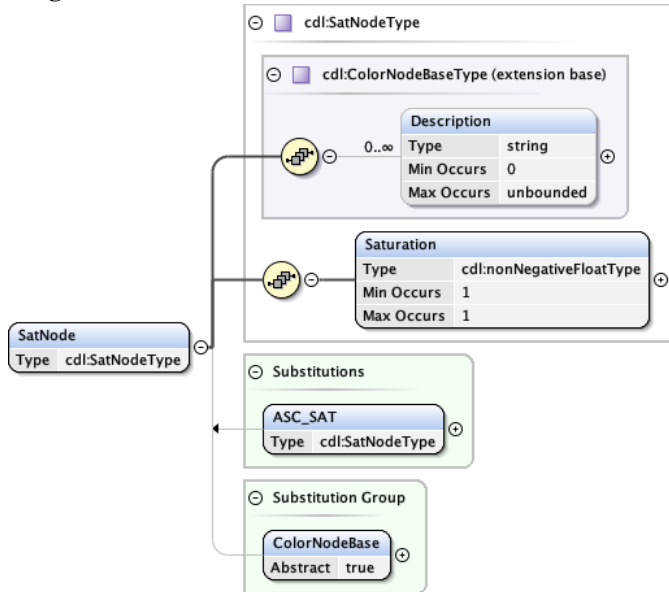
cdl:Description, cdl:Offset, cdl:Power, cdl:Slope

### 6.3.30 cdl:SatNode

#### Description:

This element is imported from the ASC-CDL schema (ASC-CDL\_schema.v1.01.xsd). It defines a Saturation node. See the ASC-CDL documentation for more information on its usage.

#### Diagram:



#### Type:

cdl:SatNodeType

#### Required or Optional:

Choice of cdl:SOPNode and cdl:SatNode or cdl:ColorCorrectionRef required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none Optional: none

#### Parent:

aces:asc-cdl

#### Children:

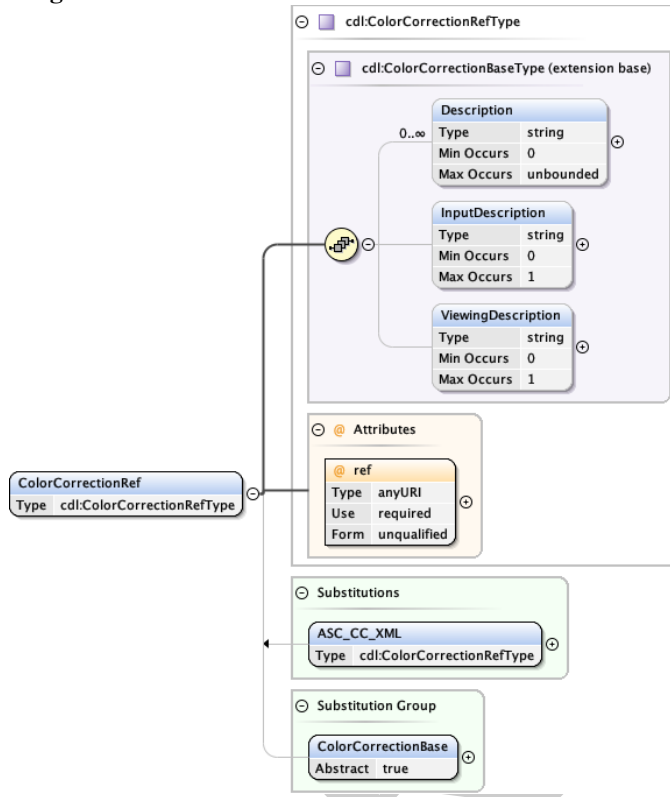
cdl:Description, cdl:Saturation

### 6.3.31 cdl:ColorCorrectionRef

#### Description:

This element is imported from the ASC-CDL schema (ASC-CDL\_schema.v1.01.xsd). It defines a Color Correction Reference node for referencing ASC-CDL values that exist in transport containers other than the AMF. See the ASC-CDL documentation for more information on its usage.

#### Diagram:



#### Type:

cdl:ColorCorrectionRefType

#### Required or Optional:

Choice of cdl:ColorCorrectionRef or cdl:SOPNode and cdl:SatNode required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: ref Optional: none

#### Parent:

aces:asc-cdl

#### Children:

cdl:Description, cdl:InputDescription, cdl:ViewingDescription

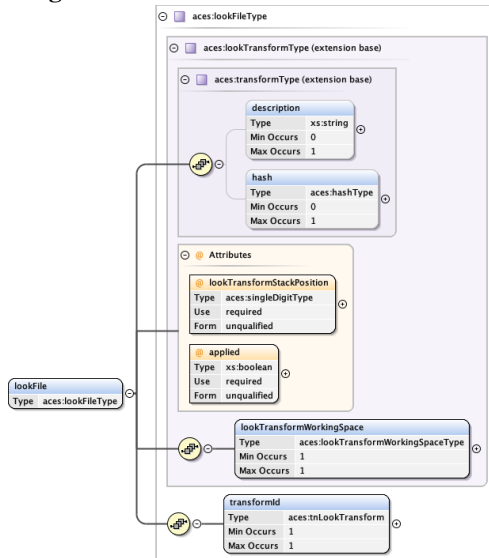


### 6.3.32 `aces:lookFile`

#### Description:

This element contains all the elements describing an ACES Look Transform stored in a referenced external file (e.g a LUT). Look transforms elements shall be applied in the order specified by the required attribute `lookTransformStackPosition` where the Look Transform with the smallest value of `lookTransformStackPosition` is applied first. The required `applied` attribute is used to indicate if the Look Transform has been applied to the essence or not. `applied="true"` indicates the Look Transform has already been applied to the essence (i.e. the Look Transform has been "baked" into the essence) and shall not be applied as part of the ACES viewing transform. `applied="false"` indicates the Look Transform has not been applied to the essence and shall be applied as part of the ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:lookFileType`

#### Required or Optional:

Choice of `aces:asc-cdl` or `aces:lookFile` required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: `lookTransformStackPosition`, `applied`  
Optional: none

#### Parent:

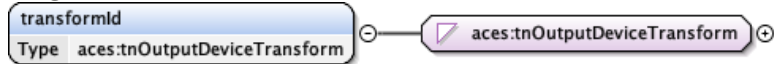
`aces:lookTransform`

#### Children:

`aces:description`, `aces:hash`, `aces:lookTransformWorkingSpace`,  
`aces:transformId`

**6.3.33** `aces:outputDeviceTransformType` / `aces:transformId`**Description:**

This element is used to communicate the transformID of the ACES Output Device Transform. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Output Transforms (ODT). The element is restricted to enforce the use of transformIDs that follow the ODT naming conventions established in the versioning system specification. As noted in the versioning system specification, manufacturer and user created transforms shall be assigned a transformID according to patterns established in the document.

**Diagram:****Type:**

`aces:tnOutputDeviceTransform`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:outputDeviceTransform`

**Children:**

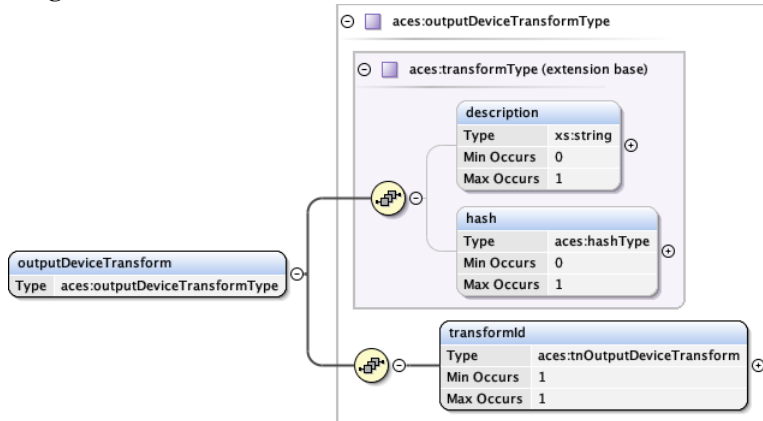
None

### 6.3.34 `aces:outputDeviceTransform`

#### Description:

This element contains all the elements containing information about the ACES Output Device Transform for a given ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:outputDeviceTransformType`

#### Required or Optional:

Choice of `aces:transformId` or `aces:outputDeviceTransformType` and `aces:referenceRenderingTransform` required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

`aces:acesOutputTransform`

#### Children:

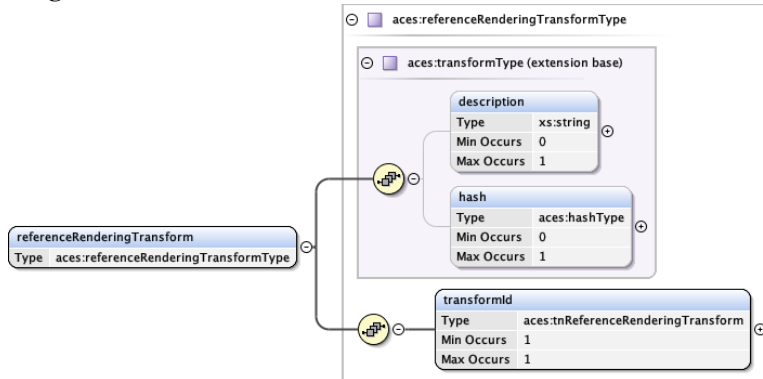
`aces:description`, `aces:hash`, `aces:transformId`

### 6.3.35 `aces:referenceRenderingTransform`

#### Description:

This element contains all the elements containing information about the ACES Reference Rendering Transform for a given ACES viewing pipeline.

#### Diagram:



#### Type:

`aces:referenceRenderingTransformType`

#### Required or Optional:

Choice of `aces:transformId` or `aces:outputDeviceTransformType` and `aces:referenceRenderingTransform` required

#### Occurrences:

Min : 1 Max : 1

#### Attributes:

Required: none

Optional: none

#### Parent:

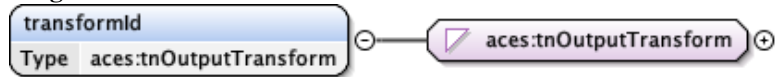
`aces:acesOutputTransform`

#### Children:

`aces:description`, `aces:hash`, `aces:transformId`

**6.3.36** `aces:outputTransformType` / `aces:transformId`**Description:**

This element is used to communicate the transformID of the ACES Output Transform. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Output Transforms (RRTODT). The element is restricted to enforce the use of transformIDs that follow the RRTODT naming conventions established in the versioning system specification. As noted in the versioning system specification, manufacturer and user created transforms shall be assigned a transformID according to patterns established in the document.

**Diagram:****Type:**

`aces:tnOutputTransform`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:outputTransform`

**Children:**

None

**6.3.37** `aces:referenceRenderingTransformType` / `aces:transformId`**Description:**

This element is used to communicate the transformID of the ACES Reference Rendering Transform. For more information on transformIDs see S-2014-002 Academy Color Encoding System – Versioning system. Valid transforms for this element are Reference Rendering Transform (RRT). The element is restricted to enforce the use of transformIDs that follow the RRT naming conventions established in the versioning system specification.

**Diagram:****Type:**

`aces:tnReferenceRenderingTransform`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:referenceRenderingTransform`

**Children:**

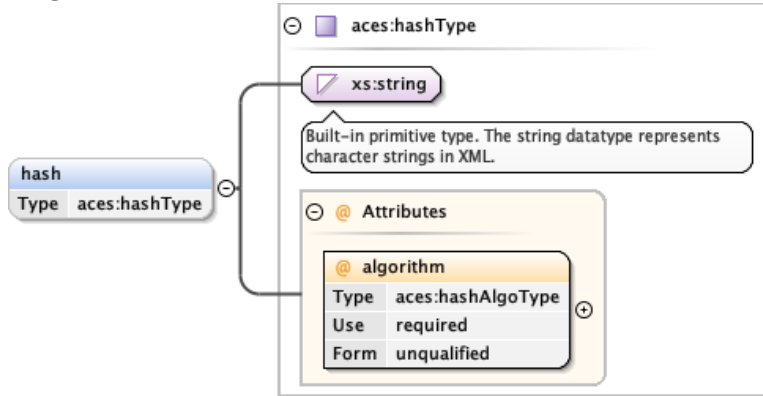
None

### 6.3.38 `aces:hash`

**Description:**

This element is used to communicate the cryptographic hash for a transform referenced by the AMF.

**Diagram:**



**Type:**

`xs:dateTime`

**Required or Optional:**

Required

**Occurrences:**

Min : 1 Max : 1

**Attributes:**

Required: none

Optional: none

**Parent:**

`aces:lookfile`, `aces:inputTransform`, `aces:outputDeviceTransform`,  
`aces:outputTransform`, `aces:referenceRenderingTransform`

**Children:**

None

## Appendix A

(normative)

### ACES Metadata File XSD Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:acesMetadata:acesMetadataFile:v1.0"
  xmlns:aces="urn:acesMetadata:acesMetadataFile:v1.0"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:cdl="urn:ASC:CDL:v1.01"
  xmlns:dcml="http://www.smpte-ra.org/schemas/433/2008/dcmlTypes/"
  xmlns:ds="http://www.w3.org/2000/09/xmlsig#"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">

  <!-- Import CDL Schema -->
  <xs:import schemaLocation="ASC-CDL_schema_v1.01.xsd"
    namespace="urn:ASC:CDL:v1.01"/>

  <!-- Import SMPTE DCML Types Schema -->
  <xs:import schemaLocation="https://smpte-ra.org/sites/default/files/st433b
    -2008-am1-2011.xsd"
    namespace="http://www.smpte-ra.org/schemas/433/2008/dcmlTypes/" />

  <!-- Import XML Sig Schema -->
  <xs:import schemaLocation="https://www.w3.org/TR/2002/REC-xmlsig-core
    -20020212/xmlsig-core-schema.xsd"
    namespace="http://www.w3.org/2000/09/xmlsig#" />

  <!-- Define general types -->
  <xs:simpleType name="singleDigitType">
    <xs:restriction base="xs:integer">
      <xs:totalDigits value="1"/>
      <xs:minInclusive value="0"/>
      <xs:maxInclusive value="9"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="dateTimeType">
    <xs:sequence>
      <xs:element name="creationDateTime" type="xs:dateTime" minOccurs="1"
        maxOccurs="1"/>
      <xs:element name="modificationDateTime" type="xs:dateTime" minOccurs="1"
        maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <!-- Define transform name types -->
  <xs:simpleType name="tnLookTransform">
    <xs:restriction base="xs:string">
      <xs:pattern value="(LMT\.\\S+\\.a\d{1}\\v\d+)|(LMT\\.Academy\\.\\S+\\.a\d{1}\\v\d
        {1}\\v\d{1})"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tnInputTransform">
```



```

    <xs:restriction base="xs:string">
      <xs:pattern value="(IDT\\.\\S+\\.a\\S+\\.v\\S+)" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tnOutputDeviceTransform">
    <xs:restriction base="xs:string">
      <xs:pattern value="(ODT\\.\\S+\\.\\S+\\.a\\d{1}\\v\\d+) | (ODT\\.Academy\\.\\S+\\.a\\d{1}\\d{1}\\d{1})" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tnOutputTransform">
    <xs:restriction base="xs:string">
      <xs:pattern value="(RRTODT\\.\\S+\\.\\S+\\.a\\d{1}\\v\\d+) | (RRTODT\\.Academy\\.\\S+\\.a\\d{1}\\d{1}\\d{1})" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tnReferenceRenderingTransform">
    <xs:restriction base="xs:string">
      <xs:pattern value="(RRT\\.a\\d{1}\\d\\.\\d+)" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tnToLookTransformWorkingSpace">
    <xs:restriction base="xs:string">
      <xs:pattern value="(ACEScsc\\.\\S+\\.a\\d{1}\\d{1}\\d{1})" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tnFromLookTransformWorkingSpace">
    <xs:restriction base="xs:string">
      <xs:pattern value="(ACEScsc\\.\\S+\\.a\\S+\\.\\S+\\.\\S+)" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="hashAlgoType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="sha256" />
      <xs:enumeration value="sha1" />
      <xs:enumeration value="md5" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="hashType">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute name="algorithm" type="aces:hashAlgoType" use="required" />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>

  <!-- Define clip identification types -->
  <xs:complexType name="sequenceType">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute name="idx" type="xs:string" use="required" />
        <xs:attribute name="min" type="xs:nonNegativeInteger" use="required" />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>

```

```

    <xs:attribute name="max" type="xs:nonNegativeInteger" use="required"/>
  </xs:extension>
</xs:simpleContent>
</xs:complexType>

<xs:complexType name="clipIdType">
  <xs:sequence>
    <xs:element name="clipName" type="xs:string" minOccurs="1" maxOccurs="1"/>
    <xs:choice minOccurs="1" maxOccurs="1">
      <xs:element name="sequence" type="aces:sequenceType"/>
      <xs:element name="file" type="xs:string"/>
      <xs:element name="uuid" type="dcml:UUIDType"/>
    </xs:choice>
  </xs:sequence>
</xs:complexType>

<!-- Define transform types -->
<xs:complexType name="transformType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0" maxOccurs="1"/>
    <xs:element name="hash" type="aces:hashType" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="inputTransformType">
  <xs:complexContent>
    <xs:extension base="aces:transformType">
      <xs:sequence>
        <xs:element name="transformId" type="aces:tnInputTransform" minOccurs="1" maxOccurs="1"/>
      </xs:sequence>
      <xs:attribute name="applied" type="xs:boolean" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="referenceRenderingTransformType">
  <xs:complexContent>
    <xs:extension base="aces:transformType">
      <xs:sequence>
        <xs:element name="transformId" type="aces:tnReferenceRenderingTransform" minOccurs="1" maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="outputDeviceTransformType">
  <xs:complexContent>
    <xs:extension base="aces:transformType">
      <xs:sequence>
        <xs:element name="transformId" type="aces:tnOutputDeviceTransform" minOccurs="1" maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

```

<xs:complexType name="outputTransformType">
  <xs:complexContent>
    <xs:extension base="aces:transformType">
      <xs:choice minOccurs="1" maxOccurs="1">
        <xs:sequence>
          <xs:element name="transformId" type="aces:tnOutputTransform" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
        <xs:sequence>
          <xs:element name="referenceRenderingTransform" type="aces:referenceRenderingTransformType" minOccurs="1" maxOccurs="1"/>
          <xs:element name="outputDeviceTransform" type="aces:outputDeviceTransformType" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
      </xs:choice>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="toLookTransformWorkingSpaceType">
  <xs:complexContent>
    <xs:extension base="aces:transformType">
      <xs:sequence>
        <xs:element name="transformId" type="aces:tnToLookTransformWorkingSpace" minOccurs="1" maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="fromLookTransformWorkingSpaceType">
  <xs:complexContent>
    <xs:extension base="aces:transformType">
      <xs:sequence>
        <xs:element name="transformId" type="aces:tnFromLookTransformWorkingSpace" minOccurs="1" maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="lookTransformWorkingSpaceType">
  <xs:sequence>
    <xs:element name="toLookTransformWorkingSpace" type="aces:toLookTransformWorkingSpaceType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="fromLookTransformWorkingSpace" type="aces:fromLookTransformWorkingSpaceType" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="lookTransformsType">
  <xs:choice minOccurs="1" maxOccurs="5">
    <xs:element name="lookFile" type="aces:lookFileType"/>
    <xs:element name="asc-cdl" type="aces:cdlType"/>
  </xs:choice>
</xs:complexType>

<xs:complexType name="lookTransformType">
  <xs:complexContent>

```

```

<xs:extension base="aces:transformType">
  <xs:sequence>
    <xs:element name="lookTransformWorkingSpace" type="aces:
      lookTransformWorkingSpaceType" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
  <xs:attribute name="lookTransformStackPosition" type="aces:singleDigitType
    " use="required"/>
  <xs:attribute name="applied" type="xs:boolean" use="required"/>
</xs:extension>
</xs:complexContent>
</xs:complexType>

<xs:complexType name="cdlType">
  <xs:complexContent>
    <xs:extension base="aces:lookTransformType">
      <xs:choice minOccurs="1" maxOccurs="1">
        <xs:sequence>
          <xs:element ref="cdl:SOPNode" minOccurs="1" maxOccurs="1"/>
          <xs:element ref="cdl:SatNode" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
        <xs:element ref="cdl:ColorCorrectionRef"/>
      </xs:choice>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="lookFileType">
  <xs:complexContent>
    <xs:extension base="aces:lookTransformType">
      <xs:sequence>
        <xs:element name="transformId" type="aces:tnLookTransform" minOccurs="1"
          maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="versionType">
  <xs:sequence>
    <xs:element name="majorVersion" type="aces:singleDigitType" minOccurs="1"
      maxOccurs="1"/>
    <xs:element name="minorVersion" type="aces:singleDigitType" minOccurs="1"
      maxOccurs="1"/>
    <xs:element name="patchVersion" type="aces:singleDigitType" minOccurs="1"
      maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="infoType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0" maxOccurs
      ="1"/>
    <xs:element name="dateTime" type="aces:dateTimeType" minOccurs="1"
      maxOccurs="1"/>
    <xs:element name="uuid" type="dcml:UUIDType" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="pipelineInfoType">

```

```

<xs:complexContent>
  <xs:extension base="aces:infoType">
    <xs:sequence>
      <xs:element name="systemVersion" type="aces:versionType" minOccurs="1"
        maxOccurs="1"/>
    </xs:sequence>
  </xs:extension>
</xs:complexContent>
</xs:complexType>

<xs:complexType name="pipelineType">
  <xs:sequence>
    <xs:element name="pipelineInfo" type="aces:pipelineInfoType" minOccurs="1"
      maxOccurs="1"/>
    <xs:element name="inputTransform" type="aces:inputTransformType" minOccurs
      ="0" maxOccurs="1"/>
    <xs:element name="lookTransforms" type="aces:lookTransformsType" minOccurs
      ="0" maxOccurs="1">
      <xs:unique name="uniqueLookTransformStackPosition">
        <xs:selector xpath="aces:lookFile | aces:asc-cdl" />
        <xs:field xpath="@lookTransformStackPosition" />
      </xs:unique>
    </xs:element>
    <xs:element name="outputTransform" type="aces:outputTransformType"
      minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<!-- Define ACES Metadata File element -->
<xs:element name="acesMetadataFile">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="amfInfo" type="aces:infoType" minOccurs="1" maxOccurs
        ="1"/>
      <xs:element name="clipId" type="aces:clipIdType" minOccurs="0" maxOccurs
        ="1"/>
      <xs:element name="pipeline" type="aces:pipelineType" minOccurs="1"
        maxOccurs="1"/>
      <xs:element name="archivedPipeline" type="aces:pipelineType" minOccurs="0"
        maxOccurs="10"/>
    </xs:sequence>
    <xs:attribute name="version" type="xs:decimal" use="required" fixed="1.0"/>
  </xs:complexType>
</xs:element>
</xs:schema>

```

## Appendix B

(informative)

### Sample ACES Metadata File XML

#### Example 1

```
<?xml version="1.0" encoding="UTF-8"?>
<aces:acesMetadataFile
  xmlns:aces="urn:acesMetadata:acesMetadataFile:v1.0"
  xsi:schemaLocation="urn:acesMetadata:acesMetadataFile:v1.0 file:
    acesMetadataFile.xsd"
  xmlns:cdl="urn:ASC:CDL:v1.01"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  version="1.0">
  <aces:amfInfo>
    <aces:dateTime>
      <aces:creationDateTime>2020-11-10T13:20:00Z</aces:creationDateTime>
      <aces:modificationDateTime>2020-11-10T13:20:00Z</aces:
        modificationDateTime>
    </aces:dateTime>
  </aces:amfInfo>
  <aces:pipeline>
    <aces:pipelineInfo>
      <aces:dateTime>
        <aces:creationDateTime>2020-11-10T13:20:00Z</aces:creationDateTime>
        <aces:modificationDateTime>2020-11-10T13:20:00Z</aces:
          modificationDateTime>
      </aces:dateTime>
      <aces:systemVersion>
        <aces:majorVersion>1</aces:majorVersion>
        <aces:minorVersion>1</aces:minorVersion>
        <aces:patchVersion>0</aces:patchVersion>
      </aces:systemVersion>
    </aces:pipelineInfo>
    <aces:outputTransform>
      <aces:transformId>RRTODT.Academy.Rec2020_1000nits_15nits_ST2084.a1
        .1.0</aces:transformId>
    </aces:outputTransform>
  </aces:pipeline>
</aces:acesMetadataFile>
```

## Example 2

```

<?xml version="1.0" encoding="UTF-8"?>
<aces:acesMetadataFile
  xmlns:aces="urn:acesMetadata:acesMetadataFile:v1.0"
  xsi:schemaLocation="urn:acesMetadata:acesMetadataFile:v1.0 file:
    acesMetadataFile.xsd"
  xmlns:cdl="urn:ASC:CDL:v1.01"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  version="1.0">
  <aces:amfInfo>
    <aces:description>Oscar Winning Movie</aces:description>
    <aces:dateTime>
      <aces:creationDateTime>2019-09-19T13:20:00</aces:creationDateTime>
      <aces:modificationDateTime>2019-11-27T13:20:00Z</aces:
        modificationDateTime>
    </aces:dateTime>
    <aces:uuid>urn:uuid:afe122be-59d3-4360-ad69-33c10108fa7a</aces:uuid>
  </aces:amfInfo>
  <aces:clipId>
    <aces:clipName>A001C012</aces:clipName>
    <aces:sequence idx="#" min="1" max="240">A001_C012_AE0306_###.exr</aces:
      sequence>
  </aces:clipId>
  <aces:pipeline>
    <aces:pipelineInfo>
      <aces:description>Oscar Winning Movie Final DI</aces:description>
      <aces:dateTime>
        <aces:creationDateTime>2019-09-19T13:20:00</aces:creationDateTime>
        <aces:modificationDateTime>2019-11-27T13:20:00Z</aces:
          modificationDateTime>
      </aces:dateTime>
      <aces:uuid>urn:uuid:be6Ec2ea-a6DC-6cBC-ff0D-AfCED5FF3Dd8</aces:uuid>
      <aces:systemVersion>
        <aces:majorVersion>1</aces:majorVersion>
        <aces:minorVersion>0</aces:minorVersion>
        <aces:patchVersion>3</aces:patchVersion>
      </aces:systemVersion>
    </aces:pipelineInfo>
    <aces:inputTransform applied="true">
      <aces:description>IDT from Acme Camera Company</aces:description>
      <aces:hash algorithm="sha256">1531
        ea6ef06c5b0a5bea80c94f60c7b68e3989e3c90b8ebd25c28aa4670c30f8</aces:
        hash>
      <aces:transformId>IDT.Acme.Camera.a1.v1</aces:transformId>
    </aces:inputTransform>
    <aces:lookTransforms>
      <aces:asc-cdl lookTransformStackPosition="0" applied="true">
        <aces:description>Technical Grade</aces:description>
        <aces:lookTransformWorkingSpace>
          <aces:toLookTransformWorkingSpace>
            <aces:transformId>ACEScsc.ACES_to_ACEScct.a1.0.3</aces:
              transformId>
          </aces:toLookTransformWorkingSpace>
          <aces:fromLookTransformWorkingSpace>
            <aces:transformId>ACEScsc.ACEScct_to_ACES.a1.0.3</aces:
              transformId>
          </aces:fromLookTransformWorkingSpace>
        </aces:lookTransformWorkingSpace>
      </aces:lookTransformStackPosition="0" applied="true">

```

```

    <cdl:ASC_SOP>
      <cdl:Slope>2.0 2.0 2.0</cdl:Slope>
      <cdl:Offset>0.1 0.1 0.1</cdl:Offset>
      <cdl:Power>1 1 1</cdl:Power>
    </cdl:ASC_SOP>
    <cdl:ASC_SAT>
      <cdl:Saturation>1</cdl:Saturation>
    </cdl:ASC_SAT>
  </aces:asc-cdl>
  <aces:lookFile lookTransformStackPosition="1" applied="false">
    <aces:description>Acme DI Show Look</aces:description>
    <aces:hash algorithm="sha256">
      e3b0c44298fc1c149afb4c8996fb92427ae41e4649b934ca495991b7852b855
    </aces:hash>
    <aces:lookTransformWorkingSpace>
      <aces:toLookTransformWorkingSpace>
        <aces:description>Use ACEScc as the working space for this LMT
          </aces:description>
        <aces:hash algorithm="sha256">07
          eb8b020fe8fc10c8c4b983cc37798324c7eee1319f07dd0028fca96f904a7f
        </aces:hash>
        <aces:transformId>ACEScsc.ACES_to_ACEScc.a1.0.3</aces:
          transformId>
      </aces:toLookTransformWorkingSpace>
      <aces:fromLookTransformWorkingSpace>
        <aces:hash algorithm="sha256">
          ef461a45beded2c5204371f755ca2558e61743f288f3ccd719ce1de23ebcf9cb
        </aces:hash>
        <aces:transformId>ACEScsc.ACEScc_to_ACES.a1.0.3</aces:
          transformId>
      </aces:fromLookTransformWorkingSpace>
    </aces:lookTransformWorkingSpace>
    <aces:transformId>LMT.AcmeDI.a1.v5</aces:transformId>
  </aces:lookFile>
</aces:lookTransforms>
<aces:outputTransform>
  <aces:referenceRenderingTransform>
    <aces:description>ACES v1.0.3 RRT</aces:description>
    <aces:hash algorithm="sha256">
      c81af4fb4a22ee0353308e4582708951df4682bf73f838c24bf44e585fc3bb61
    </aces:hash>
    <aces:transformId>RRT.a1.0.3</aces:transformId>
  </aces:referenceRenderingTransform>
  <aces:outputDeviceTransform>
    <aces:description>P3D60 ODT</aces:description>
    <aces:hash algorithm="sha1">
      efd279a82c2d52ee8c49dc0793499dc86bb1a4a3fa0dfb420d59c2814c55aea6
    </aces:hash>
    <aces:transformId>ODT.Academy.P3D60_48nits.a1.0.3</aces:transformId>
  </aces:outputDeviceTransform>
</aces:outputTransform>
</aces:pipeline>
</aces:acesMetadataFile>

```



### Example 3

```

<?xml version="1.0" encoding="UTF-8"?>
<aces:acesMetadataFile
  xmlns:aces="urn:acesMetadata:acesMetadataFile:v1.0"
  xsi:schemaLocation="urn:acesMetadata:acesMetadataFile:v1.0 file:
    acesMetadataFile.xsd"
  xmlns:cdl="urn:ASC:CDL:v1.01"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  version="1.0">
  <aces:amfInfo>
    <aces:description>Oscar Winning Movie</aces:description>
    <aces:dateTime>
      <aces:creationDateTime>2019-09-19T13:20:00</aces:creationDateTime>
      <aces:modificationDateTime>2019-11-27T13:20:00Z</aces:
        modificationDateTime>
    </aces:dateTime>
    <aces:uuid>urn:uuid:afe122be-59d3-4360-ad69-33c10108fa7a</aces:uuid>
  </aces:amfInfo>
  <aces:clipId>
    <aces:clipName>A001C030</aces:clipName>
    <aces:uuid>urn:uuid:797c7cd8-4eb1-4f67-afce-af2b0ald0285</aces:uuid>
  </aces:clipId>
  <aces:pipeline>
    <aces:pipelineInfo>
      <aces:description>Oscar Winning Movie DI Regrade</aces:description>
      <aces:dateTime>
        <aces:creationDateTime>2020-11-10T13:20:00Z</aces:creationDateTime>
        <aces:modificationDateTime>2020-11-10T13:20:00Z</aces:
          modificationDateTime>
      </aces:dateTime>
      <aces:uuid>urn:uuid:be6Ec2ea-a6DC-6cBC-ff0D-AfCED5FF3Dd8</aces:uuid>
      <aces:systemVersion>
        <aces:majorVersion>1</aces:majorVersion>
        <aces:minorVersion>0</aces:minorVersion>
        <aces:patchVersion>3</aces:patchVersion>
      </aces:systemVersion>
    </aces:pipelineInfo>
    <aces:inputTransform applied="true">
      <aces:description>IDT from Acme Camera Company</aces:description>
      <aces:hash algorithm="sha256">1531
        ea6ef06c5b0a5bea80c94f60c7b68e3989e3c90b8ebd25c28aa4670c30f8</aces:
        hash>
      <aces:transformId>IDT.Acme.Camera.a1.v1</aces:transformId>
    </aces:inputTransform>
    <aces:lookTransforms>
      <aces:asc-cdl lookTransformStackPosition="0" applied="true">
        <aces:description>Technical Grade</aces:description>
        <aces:lookTransformWorkingSpace>
          <aces:toLookTransformWorkingSpace>
            <aces:transformId>ACEScsc.ACES_to_ACEScct.a1.0.3</aces:
              transformId>
          </aces:toLookTransformWorkingSpace>
          <aces:fromLookTransformWorkingSpace>
            <aces:transformId>ACEScsc.ACEScct_to_ACES.a1.0.3</aces:
              transformId>
          </aces:fromLookTransformWorkingSpace>
        </aces:lookTransformWorkingSpace>
      <cdl:SOPNode>

```

```

        <cdl:Slope>2.0 2.0 2.0</cdl:Slope>
        <cdl:Offset>0.1 0.1 0.1</cdl:Offset>
        <cdl:Power>1 1 1</cdl:Power>
    </cdl:SOPNode>
    <cdl:SatNode>
        <cdl:Saturation>1</cdl:Saturation>
    </cdl:SatNode>
</aces:asc-cdl>
<aces:lookFile lookTransformStackPosition="1" applied="false">
    <aces:description>Acme DI Show Look</aces:description>
    <aces:hash algorithm="sha256">
        e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855
    </aces:hash>
    <aces:lookTransformWorkingSpace>
        <aces:toLookTransformWorkingSpace>
            <aces:description>Use ACEScc as the working space for this LMT
            </aces:description>
            <aces:hash algorithm="sha256">07
                eb8b020fe8fc10c8c4b983cc37798324c7eee1319f07dd0028fca96f904a7f
            </aces:hash>
            <aces:transformId>ACEScsc.ACES_to_ACEScc.a1.0.3</aces:
                transformId>
        </aces:toLookTransformWorkingSpace>
        <aces:fromLookTransformWorkingSpace>
            <aces:hash algorithm="sha256">
                ef461a45beded2c5204371f755ca2558e61743f288f3ccd719ce1de23ebcf9cb
            </aces:hash>
            <aces:transformId>ACEScsc.ACEScc_to_ACES.a1.0.3</aces:
                transformId>
        </aces:fromLookTransformWorkingSpace>
    </aces:lookTransformWorkingSpace>
    <aces:transformId>LMT.AcmeDI.a1.v5</aces:transformId>
</aces:lookFile>
</aces:lookTransforms>
<aces:outputTransform>
    <aces:referenceRenderingTransform>
        <aces:description>ACES v1.0.3 RRT</aces:description>
        <aces:hash algorithm="sha256">
            c81af4fb4a22ee0353308e4582708951df4682bf73f838c24bf44e585fc3bb61
        </aces:hash>
        <aces:transformId>RRT.a1.0.3</aces:transformId>
    </aces:referenceRenderingTransform>
    <aces:outputDeviceTransform>
        <aces:description>P3D60 ODT</aces:description>
        <aces:hash algorithm="sha1">
            efd279a82c2d52ee8c49dc0793499dc86bb1a4a3fa0dfb420d59c2814c55aea6
        </aces:hash>
        <aces:transformId>ODT.Academy.P3D60_48nits.a1.0.3</aces:transformId>
    </aces:outputDeviceTransform>
</aces:outputTransform>
</aces:pipeline>
<aces:archivedPipeline>
    <aces:pipelineInfo>
        <aces:description>Oscar Winning Movie Final DI</aces:description>
        <aces:dateTime>
            <aces:creationDateTime>2019-09-19T13:20:00</aces:creationDateTime>
            <aces:modificationDateTime>2019-11-27T13:20:00Z</aces:
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        </aces:dateTime>
    </aces:pipelineInfo>
</aces:archivedPipeline>

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<aces:uuid>urn:uuid:d89931e8-bd46-4b70-b8e9-3068cf8b91a3</aces:uuid>
<aces:systemVersion>
  <aces:majorVersion>1</aces:majorVersion>
  <aces:minorVersion>0</aces:minorVersion>
  <aces:patchVersion>3</aces:patchVersion>
</aces:systemVersion>
</aces:pipelineInfo>
<aces:inputTransform applied="true">
  <aces:description>IDT from Acme Camera Company</aces:description>
  <aces:hash algorithm="md5">1531
    ea6ef06c5b0a5bea80c94f60c7b68e3989e3c90b8ebd25c28aa4670c30f8</aces:
    hash>
  <aces:transformId>IDT.Acme.Camera.a1.v1</aces:transformId>
</aces:inputTransform>
<aces:lookTransforms>
  <aces:asc-cdl lookTransformStackPosition="0" applied="false">
    <aces:description>Technical Grade</aces:description>
    <aces:lookTransformWorkingSpace>
      <aces:toLookTransformWorkingSpace>
        <aces:transformId>ACEScsc.ACES_to_ACEScct.a1.0.3</aces:
        transformId>
      </aces:toLookTransformWorkingSpace>
      <aces:fromLookTransformWorkingSpace>
        <aces:transformId>ACEScsc.ACEScct_to_ACES.a1.0.3</aces:
        transformId>
      </aces:fromLookTransformWorkingSpace>
    </aces:lookTransformWorkingSpace>
    <cdl:SOPNode>
      <cdl:Slope>1.5 1.5 1.5</cdl:Slope>
      <cdl:Offset>0.1 0.1 0.1</cdl:Offset>
      <cdl:Power>1 1 1</cdl:Power>
    </cdl:SOPNode>
    <cdl:SatNode>
      <cdl:Saturation>1</cdl:Saturation>
    </cdl:SatNode>
  </aces:asc-cdl>
  <aces:lookFile lookTransformStackPosition="1" applied="false">
    <aces:description>Acme DI Show Look</aces:description>
    <aces:hash algorithm="sha256">
      e3b0c44298fclc149afbf4c8996fb92427ae41e4649b934ca495991b7852b855
    </aces:hash>
    <aces:lookTransformWorkingSpace>
      <aces:toLookTransformWorkingSpace>
        <aces:description>Use ACEScc as the working space for this LMT
        </aces:description>
        <aces:hash algorithm="sha256">07
          eb8b020fe8fc10c8c4b983cc37798324c7eee1319f07dd0028fca96f904a7f
        </aces:hash>
        <aces:transformId>ACEScsc.ACES_to_ACEScc.a1.0.3</aces:
        transformId>
      </aces:toLookTransformWorkingSpace>
      <aces:fromLookTransformWorkingSpace>
        <aces:hash algorithm="sha256">
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        </aces:hash>
        <aces:transformId>ACEScsc.ACEScc_to_ACES.a1.0.3</aces:
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    </aces:lookTransformWorkingSpace>
  </aces:lookTransformWorkingSpace>

```

```
<aces:transformId>LMT.AcmeDI.a1.v5</aces:transformId>
</aces:lookFile>
</aces:lookTransforms>
<aces:outputTransform>
  <aces:description>Some HDR Output Transform</aces:description>
  <aces:hash algorithm="sha256">9
    ffd28772e244f9a3c6e9893f499f2b4f2f3313d292db51aeaa4fd3f65f00d9</
    aces:hash>
  <aces:transformId>RRTODT.Acme.HDRODT.a1.v3</aces:transformId>
</aces:outputTransform>
</aces:archivedPipeline>
</aces:acesMetadataFile>
```

DRAFT