VES Transfer Specifications Guide

VES Transfer Specification 1.0.0

Visual Effects production requires a constant exchange of image sequence data between the VFX houses and the studios including full resolution uncompressed source or final plates and compressed files for the editorial department.

This document provides an introduction to the VES Transfer Specification template and a guide on how to use it effectively to define how Visual Effects vendors should ingest and deliver image data for visual effects production.

Based on the feedback of multiple VFX vendors involved with hundreds of productions, VES Transfer Specs have been introduced with the following goals:
- Provide a standard reference on which information VFX vendors require for visual effects production
- Suggest a common nomenclature
- Suggest best practices on how specifications should be provided and when
- Clearly identify specifications that cannot be easily changed once vfx production has started from information that is less critical and can be easily tweaked at a later stage
- Suggest best practices for certain aspects of the delivery process

Using these templates benefits both production teams and VFX vendors, reducing the number of iterations required to establish the production pipeline for each show.

The VFX Transfer Specs package includes two documents:
- VFX Transfer Specs Guide. This document.
- VFX Transfer Specs Sample. A complete example based on a recent production.

Templates are provided as Word documents in order to be aligned with existing working practices and for easy extensibility. The initial focus is more on capturing all required specifications rather than on automating ingestion of this data, but future iterations of this project may focus on a more formal standardization to enable automation.

General Concepts

One important goal of this document is to separate key specifications which affect how image data is processed and must be well defined prior to turnover of plates, from

information which does not affect the production process and can be provided or changed at a later stage.

In these templates, fields marked in **Red** are required in order for VFX work to begin and affect the workflow adopted by the VFX vendor. Changes to any of these fields should be kept to a minimum and agreed with the vendor as this could require part of the work to be done again.

Fields marked in **Green** are required by the VFX vendor, but do not affect the production data workflow and changes to these specifications can generally be accommodated more easily.

Fields marked in **Blue** are optional. The specifications of these fields are not required for the VFX vendor to complete the work. Not providing a specification implies that any solution identified by the VFX vendor should be considered valid as long as all other required specifications are met. Defining some of these fields after plate turnover may result in a significant amount of work to be wasted and should be agreed with the VFX vendor.

A first version of the VES Transfer document, containing at least all the fields marked in red should be provided to the VFX vendor prior to the first turnover of plates or before the start of any VFX work.

*New versions of the specifications can be provided at any stage, but **changes to fields marked in red or blue should be agreed with the VFX vendor as they may result in additional work being required**.*

Throughout this document, sections in Italics, should be considered recommendations on best practices for a particular field.

Specifications overview

The VES Transfer Specification document includes the following sections:

- **Front Page**. This page defines the name of the project and information about the specific revision of the transfer specs document.
- **Plates and formats.** This section defines the types of plates used on the show and, optionally, how they should be processed in order to convert them to a working format. The frame formats defined in this section are referenced in the following sections.
- **Color Management.** This section provides information on how to manage colors for the show. The goal is to ensure that each deliverable will have the expected color and that viewing conditions at the VFX vendor facilities are equivalent to the conditions where client reviews and approvals are happening.
- **Stereoscopic data.** This optional section should provide information required to display and stereoscopic data for any stereoscopic native projects.
- **Editorial/Frame counting.** This section provides information on how frames are numbered, shot handles and other editorial aspects.
- **Deliverables**. This section defines the set of deliverables that the VFX vendor needs to provide for the project. For each deliverable, information such as file format, encoding and file naming are specified.
- **Data transfers.** Details on how data will be transferred to and from the VFX vendor.
- **Additional notes.** An additional section for any extra information

Front Page

The front page will include a table with the following information:

Project Codename:	Code to be used as an identifier for the project. This is the code that will be used in all communication to the vendor and that the vendor should be using internally if possible. This project code, or an abbreviation, is often used in file system paths, asset tracking systems and changes during production can be problematic. *It is recommended to provide a long form codename for the project, unrelated to the final title of the movie, together with a preferred 3-4 letters short code. VFX vendors may not be able to use the preferred short code, for instance in case that code has already been used internally, and use another abbreviation instead.*
Project Logo:	If any specific Logo should be used on the project it can be added here. This is optional.
Document Version:	Every new submission of the Transfer Specs document for the project should increment the version number. It is assumed that specifications contained in a document with a higher Document Version should be used when multiple versions have been shared.
Document Version Date:	The date the version of the Transfer Specs document was created, yyyy-mm-dd.
Change Log:	Every new version of the document should include a summary of all the changes that have been introduced in this version. This ensures that any changes to the specifications can be easily identified and adopted as soon as possible.
Author:	Contact details for the author of the document in case of questions.

Plates and Formats

This section provides information on how plates will be named on turnover as well as a list of the plate types used on the project. For each type of plate, it defines information about which camera was to capture the data, any cropping or resizing that may have happened before turnover and any recommendations for working resolutions.

Plates Naming: Naming convention for plates delivered to VFX.
Naming conventions can be used to clarify which plates are to be used as main plate, foreground, background, reference etc.

The [Entertainment Technology Center](#) released a specification for best practices with naming image sequences such as plates and comps for VFX. The example below follows the ETC guidelines but please refer to the [ETC VFX Image Sequence Naming specification](#) for more details.

<SHOW>_<SEQ>_<SHOT>_<TYPE>_<VENDOR>_<VER#>.<FRAME#>.<EXT>

E.g. un-ff25_ib_0100_bg_dd_v001.1000.exr

Common TYPEs of plates include the following:

> *mp: Main Plate when only one element is required to produce the final VFX work*
> *bg: BackGround plate for VFX work requiring multiple elements*
> *fg: ForeGround plate for VFX work requiring multiple elements*
> *el: ELement plate for VFX work requiring multiple elements*
> *cp: Clean Plate to be used for cleanup work*
> *rp: Reference Plate such as lighting reference*

Formats:
When describing formats (resolutions and aspect ratio), we will use the following notation:
[width]x[height] par [pixel_aspect_ratio]   *e.g. 3414x2198 par 2.0*

When describing Crop operations we will use the following notation:
[left],[bottom],[right],[top]   *E.g. 267, 19, 3147, 2179*

Where left, bottom, right and top represent the zero-based pixel coordinates of the cropped image area with origin on the lower left.

The crop: 267,19,3147,2179 relative to the format: 3414x2198 par 2.0 means that:
> *- the leftmost column of pixels in the cropped image corresponds to the 268th column of*

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the original format,
- *the bottom pixel row of the cropped image is the 20th row of the original format,*
- *the rightmost column of pixels in the cropped image corresponds to the 3146th column of the original format*
- *the top pixel row of the cropped image is the 2178th row of the original format*
- *each pixel in the cropped image (and in the full plate) represents a 2:1 horizontal compression of the captured scene relative to what a spherical lens capture of that scene would have produced*

Although it may not be essential for all types of VFX work, providing full details on how images have been captured and how they may have been reformatted before delivery to VFX vendors is important to ensure that the relationships between focal length, aperture, defocus size etc are accurately taken into account. Although some of the fields below, such as capture crop, are considered to be optional for very simple 2d VFX work, they will be required for any more complex VFX.

For each camera used in production, one paragraph/table has to be provided containing the following information:

Plate format Name:	This is the name used to identify this particular plate format. Is often a combination of a camera and lens type combined with additional qualification such as cropping format etc. E.g. "Red Epic Spherical", "Alexa Anamorphic 90", etc
Camera Model:	This is the camera model used to capture this format. This is useful to identify the size of the sensor that has captured the information required for accurate camera tracking. This information is usually available in the camera sheet data for each shot. E.g. 'Alexa XT' or 'Red Epic' Providing information on the camera model used to capture the footage, although not strictly required for simple VFX work is highly recommended for general VFX work.
Capture Resolution:	This is the resolution and aspect ratio that was captured on camera, the format should be: [Width]x[Height] par [PixelAspectRatio]. E.g. 3414x2198 par 2.0
Capture Crop:	If any cropping has already been applied to the capture

	resolution in order to deliver the plate it should be described here. This can be an in-camera crop or any additional crop applied before delivery of the plate to the VFX vendor. It is useful to understand the relationship between image sensor size and the plates. It should be provided as 4 comma separated numbers describing the cropping values corresponding to *Left, Bottom, Right, Top* <u>this is relative to Capture Resolution.</u> E.g. 267, 19, 3147, 2179
Plate Resolution:	This is the resolution and aspect ratio of the image data provided to VFX houses for this plate format. E.g. 2880x2160 par 2.0
Plate File Format:	This is the file format of the plates data provided to VFX houses. *Commonly used file formats are 'exr' for linear data and 10bit log 'dpx' for log encoded data.*
Working Crop:	This is any crop that should be applied to the plates before VFX production. Defined as Left, Bottom, Right, Top pixel values within the Plate Resolution. Providing a Working Crop is usually recommended particularly when multiple VFX houses are collaborating on the project. If not defined, the VFX vendor may decide to work directly at the crop level required for the Final Delivery limiting the ability to change the Final Delivery cropping for shots already in progress. E.g. 0, 0, 2880, 2160
Working Resolution:	This optional section represents the recommended resolution to use in shot production for this Plate Format. *Providing a Working Resolution is usually recommended particularly when multiple VFX houses are collaborating on the project. If not defined, the VFX vendor may decide to work directly at the Final Delivery Resolution limiting the ability to change Final Delivery Resolution for shots already in progress.* E.g. 2880x1080 par 1.0
Working Picture area:	This optional section can be used to specify a portion of the image that can be ignored by the VFX houses. This can be the case, for instance when the final delivery format has a very different aspect ratio from the one used for final projection. In such cases, identifying a Working Picture Area will avoid any wasted effort creating VFX content outside of the Working

	Picture Area. If not defined, it is assumed that the whole area included in the Final Delivery should contain VFX work. *Defined as Left, Bottom, Right, Top pixel values within the Plate or Working Resolution Format.* E.g. 0, 10, 2448, 908 of Working Resolution
Projection area:	This is the part of the image that will be projected in Cinemas. Can be used for instance when running reviews internally. *Defined as Left, Bottom, Right, Top pixel values within the Plate or Working or Final Delivery Image.* E.g. 200, 54,1998, 864 of Final Delivery
Resizing Filter:	In order to ensure consistency when multiple VFX vendors are working on the same project, it can be useful to fully specify the filter to be used for any resizing operations. If not defined, it is assumed that any filtering option will be valid. *A common approach to specifying filtering options is to provide the filter name to be used in a popular compositing system. The color space to be used for the resizing should be defined as well.* E.g. Nuke's Reformat 'Cubic' filter applied in ACEScct.
Plate processing script:	If a specific script is available to define the formatting workflow for this plate format, it should be described here. If left blank it is assumed that any implementation, compatible with the specs above will be considered valid. *A Nuke compositing script is the best option to provide this information.*
Additional info:	This section can be used to provide additional information related to the plate format.
Metadata:	This section can be used to specify additional metadata that will be provided with the plate or that may be required for the delivery.
Stereo:	Yes or No. Define whether the data provided in this format will be stereo native.
Color Space:	Providing a full specification of the color space for the data will help VFX vendors accurately convert data from multiple

	sources into the same color space. *Best practice is to provide a color space from the [OCIO ACES config](#). Any other color space should be fully defined by color primaries, whitepoint and transfer function.* E.g. 'Input - ARRI - Linear - ALEXA Wide Gamut', 'ACES - ACES2065-1', 'Input - RED - REDlogFilm - DRAGONcolor2'

At the end of the table, an **Image Processing Charts/Diagram** section can be included to visually present the image operations that need to be performed on this specific format to produce the intended Working Resolution.

Color Management

The goal of this section is to help VFX houses replicate the viewing conditions and grading setup used by the client-side production team when reviewing VFX work. This helps reduce wasted efforts on both ends ensuring that creative comments are addressed correctly and that there are no surprises at the final DI stage.
It also helps to ensure that each deliverable will include any required color transformations.

Color Management Contact: The contact details (name, email) for the main contact for any questions related to color management on the show.

Color States:
In order to specify how image sequences should be color processed, we introduce the notion of "Color States" which define the multiple types of colour transformations to be used for the project. Each Color State is associated with a name and a well defined set of color transformations to turn the source plates data to the Color State in question.

An example of a Color State is a "Display Color State" which defines the viewing processes that should be applied to the source plates in order to display them on a calibrated monitor. The same Display Color State may be used, for instance, to bake the viewing transformation for a Quicktimes deliverable.
This section defines the multiple Color States to be used on the show and how to transform source plates image data for each one of them. The Color States defined here are referenced in the following Deliverables section where each deliverable is assigned to its corresponding Color State.

For each Color State one of the following tables is required:

Color State Name:	This is the name used to identify this particular Color State. For instance: Source Color or Display Color. The names of these

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	Color States are used in the Deliverables section to define which Color State should be applied for each deliverable
Color State Description:	A description of this Color State

Color State Data:	If additional data needs to be provided for this Color State, it should be described here. For instance any LUT files or .cc, .cdl that will be provided to the VFX vendor.
	
	For example:
	● Shot CC grade - provided for each shot at turnover with name: sequence_shot.cc Any specific naming conventions for these .cc files should be defined here.
	● Viewing LUT
	    o for Rec 709 devices: SHOW_display_rec709.3dl
	    o for P3 devices: SHOW_display_p3.3dl

Color State Transform:	This is a description of the process that the VFX house should apply in order to bring the source plates into this particular Color State. When describing a transformation it is important to include any Linear to Log conversion as well as any grading or LUT operations in addition to any Color Space transforms. *Multiple options can be used here: from color space names associated with a specific OCIO config, to Nuke scripts or verbal description. See examples in the Sample document and the following paragraph on best practices.*

By default, a '**Source Color'** status is always implicitly defined.
This is the Color State of the plates as they have been turned over.
So a paragraph like the following is implicitly included:

Color State Name:	Source Color State
Color State Description:	Represents data with the same color as the source plates
Color State Data:	None
Color State Transform:	None

If the Color State of a particular deliverable is set to 'Source Color State' it means that the

data in this particular deliverable should match the color of the source plates material.

In addition to the **'Source Color State'**, which is implicitly defined, a **'Display Color State'** should always be defined. This is the Color State for data that is ready to be displayed on a monitor or projector once all viewing processes, including any viewing LUT, have been applied. A full specification of how to transform source data for viewing on standard devices such as Rec709 and P3 monitors or projectors is required.

An example of a common Display Color State specification follows this pattern:

Color State Name:	Display Color State
Color State Description:	Data ready to be displayed on a display device such as a monitor or projector
Color State Data:	Shot CC grade - provided for each shot at turnover with name: sequence_shot.cc Viewing LUT for Rec 709 devices: SHOW_display_rec709.3dl for P3 devices: SHOW_display_p3.3dl *Common, well understood formats for Viewing LUTs are: .cube, .3dl*
Color State Transform:	Source Color State data + Lin2Log (*using a specific Lin2Log curve such as AlexaV3LogC*) + Shot CC grade (*representing a per scene or per shot look*) + Viewing LUT (*usually provided as a 3d LUT for Rec709 and P3 displays*)

Other Color States which are commonly used include:

- ***Technical Grade*** *Color State. When plates from different shots in the same sequence present some unintended variation in color, a subtle grade designed to balance these out can be introduced. This is sometimes referred to as 'neutral grade' or 'balance grade' etc. Sometimes it is provided to the VFX vendors and other times VFX vendors are requested to create it internally. It can be baked into final deliveries or not. A key aspect of the technical grade is that it should preserve as much information as possible minimizing any data loss. If a specific show requires Final Deliveries to include this Technical Grade, the corresponding* **Color State:** *section in the Final Delivery specification should be set to 'Technical Grade'.*
- ***Primary Grade*** *Color State. A creative grade is often introduced to define the 'look' for different scenes and shots. This is usually provided to the VFX vendor and needs to be included in the color transforms before a display LUT. This is usually only applied 'on the fly' when reviewing material and is not usually baked into final deliveries.*

Best practice to define Color States is to provide an OpenColorIO config file defining all the color spaces to be used for each Color State or Nuke scripts clearly showing how source plates are transformed to each Color State.

Stereoscopic Data

This section should be defined for any projects requiring processing and visualization of any stereoscopic data.

Convergence: Defines if any stereoscopic convergence information will be provided as part of plates turnover.

Common practice is to provide x, y translation values in pixels. In this case it should reference which format this x,y translation refers to and which specific plate each Convergence data applies to. For example each plates turnover could be accompanied by a .csv file containing one row for each plate in the turnover with the following forma:

plate_name, plate_x_resolution, plate_y_resolution, convergence_left_x, convergence_left_y, convergence_right_x, convergence_right_y

Should Convergence data be animated, an additional column with a frame number could be combined with multiple rows for the same plate_name to provide convergence data at different points in time. This could be combined with an indication of the desired key interpolation.

If convergence data is not provided at turnover time, this section should define whether the VFX studio is expected to define any stereoscopic convergence to be applied during reviews or deliveries.

Floating Windows: Defines any floating windows information that will be provided at plate turnover.

Examples of how to provide floating windows information include top and bottom left, top and bottom right offsets in pixels. Alternatively floating windows can be defined by specific floating windows mattes.

If floating windows data is not provided at turnover time, this section should define

whether the VFX studio is expected to define any stereoscopic floating windows to be applied during reviews or deliveries.

Editorial

This section defines how frames should be numbered, how handles at the head and tail of each shot should be handled and other related parts.

Delivery Handles: This defines the number of frames that are usually provided at the head and tail of the shots.

Work Handles: Defines the number of frames that should include VFX work.

Frame Numbering: A description of how frame numbering should work on the show.
Common practice is to deliver plates for each shot starting at 1001.
Any delivery from the VFX vendor will keep the same frame numbering, possibly adding a slate as frame 1000.

Deliverables

This section provides a list of all the types of image sequence data deliverables to be produced by the VFX vendor for 'in progress' and final deliveries. Each deliverable is identified by a Deliverable Name and this section defines all the properties required to produce it, including resizing and crop factors for each one of the Frame Formats.

The list of deliverables should always include one named 'Final Delivery' which represents the final delivery of full resolution data.
A separate Deliverable Paragraph with the following information should be provided for each deliverable.

Deliverable Name:	This is the unique name that will be used to define this deliverable. *E.g. 'Final Delivery' or 'Editorial Quicktimes'*
Description:	This optional field can be used to describe what is the purpose of this deliverable.
File Format:	This is the file format to be used for this deliverable by VFX vendors. Commonly used file formats are 'exr' for linear data and 'dpx' for log encoded data for full resolution deliverables. Movie formats such as Quicktime are commonly used for editorial usage and other work in progress reviews.

File Format configuration:	Any additional configuration/encoding details for the file format. For movie formats such as quicktimes, this should include all the codec compression details. For file formats supporting multiple channels such as 'exr', this field should specify which channels should be included. If not defined, it is assumed that 'rgb' channels only should be included. Any specific compression settings should also be defined here. *[NOTE: it would be nice here to provide a list of common Quicktime encoding formats and encourage shows to pick one of them where possible.]* *For editorial:* Avid DNxHD 36 Color Space/709 codec, Legal Range, 23.98fps *For cinesync:* MotionJpeg 85%quality Rec709 Full Range, 23.98fps
Delivery Naming Convention:	Which naming convention should be used to name files. Eg: *<SHOW>_<SEQ>_<SHOT>_<TYPE>_<VENDOR>_<VER#>.<FRAME#>.<EXT>* *un-ff25_ib_0100_bg_dd_v001.1000.exr* Refer to the ETC_VFX_Image_Sequence_Naming_specification for best practices on Image Sequence Naming for VFX.
Slate Required:	Defines if a slate needs to be included for this deliverable: Yes/No.
Slate Fields:	The list of fields to be included in the slate.
Slate Example:	An example image of the required slate can be included in this section.
Color State:	This field references the section on Color Management and defines the Color State to be used for this delivery. *Common practices are to bake all grading (such as any primary grades and viewing LUTs) into movie format deliverables such as Quicktimes. Baking any creative looks into full resolution final deliveries is usually not recommended to ensure no loss of data and allow maximum flexibility at the final DI stage.*
Stereo State:	This section should define if this deliverable represents stereoscopic data or not. For stereoscopic deliverables, it should define whether convergence offsets and floating windows should be baked into the deliverable or not.

Plate Formats Workflows:	This section defines the exact crop and resizing factors required to transform each Plate format for the current deliverable. All plates will be first cropped then resized according to the Crop and Resolution values defined below in order to produce each deliverable. For each Plate Format defined in the Plates section, a table of the following type is required:	

Plate Format Name:	The Plate Format Name of the plate format
Crop:	This defines any crop that should be applied to the current Plate Format for the current Deliverable. *Cropping should be provided as Left, Bottom, Right, Top pixel values within the Plate Resolution.* E.g. 200, 200, 1998, 1960
Resolution:	This is the resolution of the deliverable defined in this paragraph. E.g. 2448x918 par 1.0

Data Transfers

This section defines how data should be transferred to and from the VFX vendor.

Package Structure

This section defines how the data in each delivery should be packaged together.

Always ensure that each vendor will have a dedicated, separate transfer storage area, usually based on either the vendor name, or a vendor code. Unless explicitly required and authorized, different vendors should not be able to access each other's transfer storage areas.
The storage area of each vendor would normally include a FROM_$VENDOR and TO_$VENDOR. If the VFX vendor is required to provide packages to different users, it is recommended to have additional directories to clearly identify packages that represent specific types of deliveries such: e.g. DI mattes, stereo vendor deliveries etc.

When uploading data, a manifest file should always be included. When image sequences or QT's are uploaded, this can take the form of a CSV file (possibly exported from excel, shotgun, filemaker, etc) and loaded into excel should look like:

Date Submitted	Vendor	Filename	Vendor Tracking ID	Submitted	Notes
2017/12/06	AVC	ds_013_0001/v1001/ds_013_0001_v1001.mov	Your internal tracking # or Blank	For Review	We've addressed the timing notes
2017/12/06	AVC	ds_014_0001/v1501/ds_014_0001_v1501.mov	Your internal tracking # or Blank	For Review	For animation approval
2017/12/06	AVC	ds_018_0001/v1501/2048x1556/ds_018_0001_v1501.1001-12000#.dpx	Your internal tracking # or Blank	For Final	CBB - all notes addressed

The directory structure of the delivery would look like for a mythical VFX company "A VFX Company" AKA AVC:
FROM_AVC
There should be both a "FROM_AVC" and a "TO_AVC" directory.

        20170612   <YEAR><MONTH><DAY>
            AVC_022/   <COMPANY_NAME>_<BATCH>
                AVC_022.csv   Manifest File
                ds_013_0001/
                    v1001/ds_013_0001_v1001.mov
                ds_014_0001/
                    v1501/ds_014_0001_v1501.mov
                ds_018_0001/
                    v1501/
                        2048x1556/
                            ds_018_0001_v1501.1001-12000#.dpx

The frame path defined in the manifest file is relative to the
Image sequences are should adhere to the format defined by <FrameStart>-<FrameEnd># (The "#" denotes that the numbers are padded to 4 digits). And that the frames are always continuous. An example library for creating and validating these frame sequences is here:

https://github.com/sqlboy/fileseq .

Data being sent to the "AVC" company would be in a similar TO_AVC directory:

TO_AVC
    20170612
        AVC_023
            AVC_023.csv
            ...

Transfer Methodology

In this section please define which file transfer methodology should be used.
Any accounts passwords should be shared securely separately from this document.

File transfer systems commonly used include commercial solutions such as Aspera and Signiant Media Shuttle.
Secure FTP is also a safe methodology for file transfer, but normal FTP should be avoided if possible.
It is strongly recommended that separate accounts be made for each vendor.

If media is to be shared with a physical drive, details of where drives should be shipped to should be included here.
If physical drives are used, it is highly recommended that hardware encrypted drives should be used.
See relevant MPAA Guidelines, particularly sections: DS-13-0 to DS14-4 and DS-12-1.

Assets Delivery

This initial version of the VES Transfer Spec document does not include guidelines for sharing CG assets data such as models, textures, look development. Sharing of assets between VFX studios is clearly becoming a very common request and establishing good practices in this area is clearly one of the future goals of the VES Transfer Specs project.

Additional Notes

Any additional information relevant to deliverables for the project can be added here.

Acknowledgements

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