



Technical Specifications

Scope

The standards defined in this document apply to all high definition programs, program blocks, commercials, and other high definition television content provided to the English and French networks of Accessible Media Inc. for broadcast.

General HD Technical Specifications for Media Delivery

Image Format

The resolution shall be 1920 x 1080 pixels and compliant with the SMPTE ST 274-2008 standard. The sampling structure shall be 4:2:2 with 10-bit quantizing. These specifications should be preserved as much as possible throughout the complete production process.

Frame Rate

The Video frame rate shall be 29.97 frames per second, 2:1 interlaced (59.94 fields per second) noted as 29.97i.

Any show or program originally shot at another frame rate, such as 23.98p, 25p or 25i shall be made available to Accessible Media Inc converted to 29.97i.

Field Dominance

The HD interlaced video shall have a field 1 dominance (upper field first). This means that the first field captured, stamped or output is a Field 1. Cuts in material must happen on frame boundaries (i.e. between field 2 and field 1).

3:2 Pulldown (aka 2:3 pulldown)

Used to convert from film frame rate (25fps) to NTSC TV frame rate; in AMI's case - 29.97fps).

Active Format Description (AFD)

Programs have a mix of full frame 16:9 and up-converted 4:3 aspect ratio materials. These programs are distributed through a TV channel to viewers equipped with 4:3 or 16:9 aspect ratio receivers. To ensure an optimum display of each picture on a given TV receiver, AFD

information is inserted by the broadcaster and carried with each program to the TV receiver that will automatically choose the right display format for each material. This AFD information provides the recommended display format to each TV receiver.

To ensure an automatic image aspect ratio conversion, an AFD data value must be assigned to each HD program as described in the SMPTE ST 2016-1 standard. This AFD information must be inserted in the vertical ancillary data space of the HD-SDI interfacing signal as per the SMPTE ST 2016-3 standard and recorded along with the program material.

For HDCAM® and HDCAM SR® tapes, this AFD information must be inserted in the VANC data area of the HD-SDI digital video signal.

As the AFD value is constant for the duration of the Picture Track of the MXF file, the AFD value must be encoded in the Picture Descriptor of the Header Metadata, which is inserted in the MXF file, as per SMPTE standard ST-377-1:2011, section G.2.5

A correct AFD value shall be assigned to all HD programs delivered to Accessible Media Inc. Services, as shown below:

Original HD Program	Program AFD codes	Intended display format after down conversion to SD
Full Screen Image (entire picture protected)	1010	Letter Box
Full Screen Image (essential 4:3 area)	1111	Center Cut
Pillar-box Image	1001	Center Cut

AFD Codes Legend

AFD=1111 (15)	Indicates that the original HD program was shot for a full frame image that has a 4:3 area of essential information and will be center-cut during conversion to SD.
AFD=1010 (10)	Means that the original HD program was shot for a full frame image with the entire picture area protected and will be down-converted in letterbox format
AFD=1001 (9)	Indicates that the HD program originates from up-converted 4:3 SD images (displayed in HD as a pillar-box) and has a 4:3 area of information that will be center-cut during conversion to SD
AFD=1000 (8)	Means that the original HD program was shot for a full frame image with no picture area protection and can be down-converted in letterbox format. This AFD value is often used as a default mode.

Use of Original SD Material

Use of native SD visual sequences, including NTSC, PAL or SECAM analog video, or ITU-R BT.601 digital video, is accepted only in special cases; for example, insertion of archival material. The producer shall inform Accessible Media Inc. of, among other things, the total anticipated length of up-converted SD video material to be inserted into the HD program, and clearly justify its use. Any use of SD sequences in an HD program shall be approved beforehand by Accessible Media Inc.

Note: When original 4:3 SD materials are converted to 16:9 HD for insertion in an HD program, an SD to HD converter with an appropriate performance must be used to ensure a clean resizing of the images is performed (no defect on all picture edges and no Closed Captions signal on top of active picture area).

4:3 SD Material

When the use of 4:3 SD materials is essential and has been approved by Accessible Media Inc., the pillar-box aspect ratio conversion shall be used. Care must be taken to remove EIA608 closed captioning signals from lines 21 and 284 of the SD frames before conversion.

During SD to HD up-conversion:

No alteration of horizontal versus vertical proportions (geometric distortion) shall be tolerated. Conversion by horizontal stretching is therefore prohibited.

Care must be taken to ensure that the main elements of the original 4:3 composition (e.g., principal action, graphic) are preserved.

Converted materials must have the appropriate FD value, as shown in the figure below.

AFD = '1001'
4:3 (center)

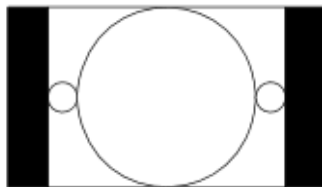


Image with a 4:3 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame.

Film-originated Material

When movies and other productions shot on film or using digital technologies equivalent to film are converted to HD and delivered to Accessible Media Inc. for broadcast, the aspect ratio shall preserve the complete original picture area. Therefore, “pan and scan” is not accepted.

The scanned area of 35mm film shall be in accordance with SMPTE ST 96M-2004, Table 2. The appropriate aspect ratio conversion mode shall be selected according to the following table.

Original Film Aspect Ratio	Aspect Ratio Conversion Mode for 16:9
1.78 (16:9)	Equivalent

1.85	Letterbox
2.39*	Letterbox

In all cases, no alteration of the original horizontal/vertical proportions (geometric distortion) shall be tolerated.

Any movie or other production originally shot on film or using digital technologies equivalent to film at a frame rate of 23.98p, or 25p shall be made available to Accessible Media Inc. in its original format and also converted to 29.97i.

Consumer Formats

Use of visual sequences acquired using consumer format equipment is usually not accepted within HD programs unless particular circumstances warrant its use; for example, shooting in confined spaces. Any use of consumer formats shall be declared by the producer prior to the signing of the contract with Accessible Media Inc. and shall be accepted only in cases of absolute necessity.

Credits

All credits shown in vertical scroll or flash-on style shall be produced in a way that makes them clearly readable when viewed at frame rate 29.97i and be free of judder or blur. These elements shall be created in 1080 29.97i.

Closed Captions

The closed captions (CC) data shall be present and provided as follows:

- EIA-608/EIA-708 data shall be carried in a SMPTE ST 334-1/2:2007 compliant ANC packet within a SMPTE ST 436:2006-compliant VBI/ANC Generic Container Element, using 8-bit encoding. This process complies with the AMWA AS-03 and AS-11 file formats. For Tapes, Closed captioning data shall be present and encoded into the VANC area of the digital video signal recorded on the tape. Accessible Media Inc. requires that line 9 be used to insert Closed Captions data.
- The closed captions on tape shall be present and encoded as EIA-608/EIA-708 data into the VANC area of the digital video (as per SMPTE ST 334-1:2007 standard) signal recorded on tape.
- The closed captions shall be of EIA 608 line 21 type (CC) encapsulated into EIA 708 data, in compliance with the EIA 708 standard. This requirement is necessary because most HDTV receivers in use at this time can only decode EIA 608 captions encapsulated into EIA 708 (and not pure 708 data packets).
- No EIA 608 type of closed caption signal, as usually found on line 21 in SD video, shall be present in the HD video signal, either in the active video area or in the vertical interval.

Lines 21 and 584 (the top lines of the active picture area) of the HD video signal shall carry picture information (Y Cb Cr values).

File Formats

If needed, a separate CC file shall be provided and the associated Time Code shall match the video time code.

- CC files associated with Broadcast versions shall be provided in .scc format (Scenarist Closed Captions).
- CC files associated with Web versions shall be provided in .srt format (Subrip Subtitle).

Time Code

- The time code (as per SMPTE standard ST 12-1:2008) shall be present and continuous from the beginning of the leader up to the end of the trailer.
- The time code shall be of drop frame type to ensure that it remains synchronous with real time. It is important to pay particular attention to drop frame when a program is transferred from 23.98 or 24 frames/seconds to 29.97 frames/seconds.
- For **Video** and **Audio** assets intended for **Broadcast**, the time code value shall be **01:00:00:00** (HH:MM:SS:FF) at the first frame of the program.
- For **Video** and **Audio** assets intended for **Web** use, the time code value shall be **00:00:00:00** (HH:MM:SS:FF) at the first frame of the program.
- Both longitudinal Time Codes (LTC) and Ancillary Time Codes (ATC) shall be recorded on tape and identical during the whole recording. The Ancillary Time code data is inserted in the VANC area of the digital video signal (as per SMPTE ST 12M-2:2008). The Ancillary Time Code is referred as VITC in the HDCAM SR. Long programs delivered on multiple tapes shall use different time code for each part starting on the next whole hour (e.g. 01:00:00:00, 02:00:00:00, etc.)
- A Time Code track shall also be present within any QuickTime file.
- Digital files shall be provided with an uninterrupted ascending time code as defined by the Time Code Track in the Material Package of the MXF file, per standard SMPTE ST 377-1:2011.

Program Length

Half-hour Time Slot

Programs created for a half-hour time slot (or 30 minute time slot) can be formatted into 3 segments that contain 2 breaks, or 4 segments that contain 3 breaks.

The total program run time for both formats must be between 22:00 and 23:00 minutes.

The run time consists of all produced content that is contained within the delivered program, including intro, bumpers and end credits.

The run time does not include breaks.

One-hour Time Slot

Programs created for a one-hour time slot (or 60 minute time slot) can be formatted into 5 segments that contain 4 breaks, or 6 segments that contain 5 breaks.

The total program run time for a 5 segment (4 breaks) must be between 47:00 and 49:00 minutes. The total program run time for a 6 segment (5 breaks) must be between 46:00 and 48:00 minutes.

The run time consists of all produced content that is contained within the delivered program, including intro, bumpers and end credits.

The run time does not include breaks.

Program Structure

Broadcast versions of HD Programs or interstitials shall include leaders and trailers as described in the following table:

Time Code (at start)	Duration	Audio	Video	Tape/File
----	10 seconds (minimum)	Silence	Black	Leader
00:58:30:00	60 seconds	Reference Tones	SMPTE RP 219 HD colour bars	
00:59:30:00	20 seconds	Silence	Slate	
00:59:50:00	9 seconds	Silence	Countdown	
00:59:59:00	1 frame	1kHz @ reference level	SMPTE RP 219 HD colour bars	
01:00:00:00	----	Program Segment #1	Program Segment #1	
----	10 seconds	Silence	Black	----
----	----	Program Segment #2	Program Segment #2	----
----	10 seconds	Silence	Black	----
----	----	Program Segment #3, etc.	Program Segment #3	----
----	10 seconds	Silence	Black	----
----	20 seconds	Silence	Slate	
----	----	Textless Segment #1	Textless Segment #1	----
----	2 seconds	Silence	Black	----
----	----	Textless Segment #2, etc.	Textless Segment #1	----
----	2 seconds	Silence	Black	----

Web versions of HD Programs or interstitials shall not include leaders and trailers as described in the following table:

Time Code (at start)	Duration	Audio	Video	Tape/File
00:00:00:00	----	Program Segment #1	Program Segment #1	----
----	2 seconds	----	----	----
----	----	Program Segment #2	Program Segment #2	----
----	2 seconds	----	----	----
----	----	Program Segment #3, etc.	Program Segment #3	----
----	2 seconds	----	----	----

Leader Structure

Colour Bars

The colour bars, in HD 16:9 format, shall be compliant with the SMPTE recommended practice RP 219-2002. The colour bars should be generated from a test generator in the edit suite that produced the final edit, and to which the edit suite has been calibrated. The colour bars must not be generated by the internal test generator of the recording VTR.

Vocal Track Identification

The recording shall include a vocal identification of the Audio Tracks in the slate lasting 60 seconds. It shall be clear, precise and sequential, such that track allocation is easily identifiable.

Audio Test Tones

A reference tone shall be present before the start of the program material; it shall be in phase and be on all audio channels used for the program. Accessible Media Inc.'s reference level is set at -20dBFS as defined in the SMPTE recommended practice RPI55-2004. It corresponds to an alignment level of +4dBu. The reference tone shall be consistent with the recorded program.

The test tone shall be 1 kHz on all channels. The length of the test tones shall be 60 seconds. Unused channels shall be silent.

Slate

The slates shall include the following information:

- Program Title
- Series name and episode title/number
- Program length (HH:MM:SS;FF)
- Main program audio type (mono, stereo, multichannel)
- Audio/Vocal track allocation
- CC (English)
- Segment #1 start time code
- Segment #2 start time code
- Segment #3 start time code, etc.
- Audio reference level (-20 or -18 DBFS)
- Integrated loudness value (-24 or -23 LKFS)
- Described video (yes, no)

Audio/Video Synchronization

The audio/video synchronization signals shall be composed of a one-frame long of colour bars and 1 kHz tone at the reference level.

Accessible Media Inc. reserves the right to reject productions that do not meet the criteria described herein. Unless otherwise specified in the document, the term “program” also includes the interstitials.

Program Segmentation

First program segment must start at timecode 01:00:00:00. Additional program segments must be separated by 2 seconds of black/silence.

Labelling

All videotapes shall be properly labelled on both the cassette and the container.

Containers

Any of the following formats is acceptable:

- MXF OPIa, per SMPTE ST 378:2004 standard. MXF files shall be closed as per SMPTE ST 377-1:2011 standard definition – section 5.2.4

Encoding

Any of the following encoded files is acceptable:

- XDCAM HD 422 @ 50 Mbps

Audio File Format

Any of the following encoding file formats is acceptable:

- Uncompressed, 2-channel audio, 24 bit @ 48kHz, mapped into an MXF. All audio channels must be contained within 1 MXF track.
- Linear PCM, 24 bit @ 48kHz wrapped in a QuickTime movie file
- Other file types will be considered by prior agreement only.

The digital audio format must be compliant with AES-3 standard, with a resolution of 24 bits and at a 48 kHz sampling rate. The recording should contain, for all the channels, the full transmittable audio bandwidth (20 Hz to 20 kHz). Exceptions may be made; examples include archive material or material gathered necessarily under adverse conditions.

For described video tracks that are outsourced, they shall be an audio wave (.wav) file, Constant bit rate at 2.304 Mbps, PCM format, 2 channel stereo 24 bit @ 48 kHz file.

Described Video

Accessible Media Inc. is acquiring external material including Described Video (DV) content and possesses the infrastructure to include this service with the on-air presentation program.

The described video channels are a stereo mix derived from the main program to which descriptive commentary is added. The audio level of these channels shall be similar to the main program level and comply with the loudness specifications described.

Audio Channel Allocation

Broadcast versions of HD Programs or interstitials shall include four stereo audio tracks (the “Audio Tracks”), which are as follows:

- MAIN + DV: Stereo audio track of main program containing DV or IDV, including described end credits
- MAIN: Stereo audio track of main program containing DV or IDV, excluding described end credits
- M&E: Stereo or dual mono audio track of music and effects only, minus dialogue for international dubbing purposes
- MAIN - M&E: Stereo or dual mono audio track of dialogue only, minus M&E for promo and dubbing purposes

Audio Tracks shall be allocated as described in the following table:

Track 1	MAIN + DV L
Track 2	MAIN + DV R
Track 3	MAIN L

Track 4	MAIN R
Track 5	M&E L
Track 6	M&E R
Track 7	MAIN - M&E (Dialogue only) L
Track 8	MAIN - M&E (Dialogue only) R

Web versions of HD Programs or interstitials shall only the MAIN + DV stereo Audio Track, allocated as follows:

Track 1	MAIN + DV L
Track 2	MAIN + DV R

Subjective Quality for Audio

The audio program shall be produced with reproduction in a domestic environment in mind.

The entire audio program shall be of superior quality, free of all noise and interference (buzz, hum, distortion, excessive sibilance)

The entire audio program shall have an acceptable dynamic range. A compression rate sufficiently high to adversely affect the sound quality shall not be accepted.

The tone shall be natural and pleasant.

Dialogue must remain intelligible throughout the entire audio program

Audio-video synchronization shall be maintained throughout the program. The maximum tolerable misalignment of sound and picture shall be \pm one field at 29.97fps.

Audio Level and Dynamic Range for HD and SD Distributions

Standard Reference Level

Accessible Media Inc.'s reference level is set at -20dBFS as defined in SMPTE recommended practice RP 155-2004. It corresponds to an alignment level of +4dBu and shall be consistent with the recorded program.

Maximum True Peak Level

The maximum true peak value can be accurately measured by oversampling peak meters. It shall be -2 DBTP during production, as defined in ATSC Document A/85, as of 25 July 2011 and measured with a meter compliant with ITU-R BS.1770-2. Guidelines for accurate peak level measurements are described in ITU-R BS.1770-2 Annex 2.

Program Loudness

Viewers watching television programmes often get annoyed when the audio loudness jumps at every commercial break, between programs or between TV channels. A reliable and consistent method for measuring program loudness is needed. Several standards have been recently developed to answer this need.

Accessible Media Inc. requires that all submitted programs be produced to meet the loudness specifications described below.

Loudness Level Measurements

The audio signal measured using a broadcast loudness meter having the ITU-R BS.1770-2 compliant algorithm shall meet the following criteria:

- For a program:
 - The dialogue loudness level measured on all channels at representative sections of anchor element (typically dialogue level) shall be -24LKFS +/- 1LU;
 - The integrated loudness measured on all channels for the complete program duration should not exceed -24 LKFS +/-2LU.
- For an interstitial:
 - The integrated loudness measured on all channels for the complete commercial duration should not exceed -24LKFS +/-1LU.

Additionally:

- The whole program shall be consistent and shall not contain dynamic excursions that could hamper listening comfort.
- No compromise shall be accepted with regard to dialogue intelligibility;

Dynamic Range and Maximum Level for SD Distribution

The program dynamic range allowed for analog broadcast transmission is 10dB with reference to the alignment level. No peak must exceed -10dBFS (instantaneous measure: rise time 0 ms, fall time 200 ms). Peaks will be limited to +14dBu on the analog distribution network.

HD Content Tape Delivery Specifications

Technical Compliance

All HD video tape content must conform to the General HD Technical Specifications set forth from the beginning of the document.

Delivery Media

Accessible Media Inc. requires that the HD material be provided on Sony HDCAM and HDCAM SR® (preferred) videotape.

File Quality

All programs must not have any video or audio impairment such as digital and colorimetric errors, compression or encoding artifacts, etc.

Right of Refusal

Accessible Media Inc. reserves the right to reject any production that fails to meet the specifications described in this document.

Content Delivery

Program providers shall contact Accessible Media Inc. for information about the delivery method. Some examples of methods we accept are through FTP, Signiant, Aspera, etc.

Computer File Specifications

Program content shall be packaged in a computer file as compressed image and sound data. The program file extension shall correspond to the container used (for example, .mxf, .mov, etc.)

Summary

	AMI Sony FS7 Camera	Broadcast	Web	Web Audio Program
Bars, Tone, Slate	N/A	YES	N/A	N/A
Breaks	N/A	10 Seconds	2 Seconds	N/A
Closed Captioning	N/A	.scc	.srt	.srt
Transcript	N/A	.doc, .docx (As Produced)	.txt (Dialogue)	.txt
Video Codec	MPEG HD 422	XDCAM50	H.264	N/A
Wrapper	.MXF (OP-1a)	.MXF (OP-1a)	.MP4	N/A
Video Bitrate	50 Mbps CBR	50 Mbps CBR	4 Mbps VBR	N/A
Video Bitrate Mode	Constant	Variable	Variable	N/A
Bit Depth	8 bits	8 bits		N/A
Video Profile	N/A	High	Main @ L3.1	N/A
Video Colour Space	422	422	420	N/A
Video Frame Rate	NTSC 29.97	NTSC 29.97	NTSC 29.97	N/A
Video Scanning Type	Interlaced	Interlaced	Progressive	N/A
Video Scanning Order	Upper Field First	Upper Field First	N/A	N/A
Video GOP Structure	N/A	Closed M=3 N=15	M=4 N=33	N/A
Video Resolution	1920 X 1080i	1920 X 1080i	1280 X 720p	N/A
Video Aspect Ratio	16:9	16:9	16:9	N/A
Audio Bit Depth	24 bits	24 bits	N/A	N/A
Audio Codec	AES	AES	AAC	MPEG Layer 3
Audio Bitrate	1152 Kbps	1152 Kbps	128 Kbps	128 Kbps
Audio Channels	2	2	2	2
Audio Format	PCM	PCM	Lossy	PCM
Audio Sample Rate	48 KHz	48 KHz	44.1 KHz	44.1 KHz