

## DCI GLOBAL TECHNICAL SPECIFICATIONS

**This exhibit contains all technical specifications for NTSC, PAL, 1125/59.94 INTERLACE HD, 1125/23.98 PROGRESSIVE HD AND 11/25/25 PROGRESSIVE HD DCI TECHNICAL REQUIREMENTS. REFER to your contracted DCI PROGRAM MATERIALS EXHIBIT for program's contracted technical requirement.**

### **GENERAL STANDARD DEFINITION TECHNICAL REQUIREMENTS**

#### **STANDARD DEFINITION VIDEO REQUIREMENTS:**

Video Footage should be acquired using formats acceptable to DCI on professional-quality media. Productions may be photographed using any of the following formats:

<b>Standard Definition Formats</b>	<b>High Definition Formats</b>	<b>Film Formats</b>
Sony Digital Betacam	Sony HDCAM	Super 16 MM Film
Sony Betacam SP	Sony HDCAM SR	35 mm film
Sony MPEG IMX 50 mb (tape)	Panasonic DVC PRO 100 mb (HD)	70 mm film (IMAX)
Sony MPEG IMX 50 mb (XDCAM)	Panasonic HD-D5 (Film Transfers)	
Panasonic DVC PRO 50 (tape)	Sony XDCAM HD (35 mpbs only)	

Material not acquired in one of the acceptable formats must be approved by the Production Manager prior to the commencement of production.

Video program material shall be produced using industry standard and accepted norms good practice and workmanship. DCI requires that its production partners use only selected codecs and media types when working in non-linear editing systems. Systems that use uncompressed SDI or JFIF 1:1 are acceptable; as are systems that use MXF compliant MPEG-2 I frame media at 50 mpbs. Systems that use Motion JPEG codecs, DV 25 media, or JFIF at ratios higher than 1:1 are not acceptable for online output. If there are questions about the qualifications of a particular editing system or type of media, please contact the DCI Technical Standards and Operations group.

#### **Acceptable Editing Codecs**

<i>Codec</i>	<i>Bit rate or Ratio</i>
Uncompressed 601 digital	270 mpbs
MPEG-2 MXF	50 mpbs I-frame
JFIF (Meridian/Symphony)	1:1

#### **Unacceptable Editing Codecs**

<i>Codec</i>	<i>Bit rate or Ratio</i>
DV 4:1:1 or 4:2:0	25 mpbs
JFIF (Meridian / Symphony)	Ratios greater than 1:1
Motion JPEG (AVR)	AVR 2 to AVR 77

Master and source videotapes must meet industry standard or industry-accepted standards for tape format interchange. All tapes should be recorded on VTRs that have been maintained in compliance with the manufacturer instructions and have been accurately calibrated per the manufacturer specifications.

#### **DCI Bug Clearance Specifications:**

DCI requires that lower third and other graphic elements containing text not interfere with the network ID keyed over the signal. Consequently, the following areas of the picture may not contain text information. All horizontal measurements are given in microseconds, with the start of the measurement at the end of the last cycle of horizontal color burst.

No text shall fall into the space between 38.7 microseconds and 50.0 microseconds between lines 190 and 243 (field 1) NTSC, lines 226 and 290 (field 1) PAL. This space represents a large portion of the lower right corner of the television image. In addition, to prevent interference with international ID's, text elements shall not be placed between 37 microseconds and the end of active picture between lines 21 and 81 (field 1) NTSC, lines 25 and 90 (field 1) PAL. This area represents the entire upper-right corner of the screen. Reference TIFF files outlining the bug clearance area can be provided on request.

#### **STANDARD DEFINITION AUDIO REQUIREMENTS:**

Audio program material shall be produced using industry standard and accepted norms for good practice and workmanship. The audio portion of the master and source audio and videotapes must be produced so that no noise, static, dropouts or extraneous distortion is recorded in the audio. The audio mix should also be well balanced and equalized, with dialogue and narration clearly able to be heard.

Audio channels - Stereo audio must be fully mono compatible. The audio channels must be in the proper phase. NOTE: Full Mono Compatibility means that when the left and right stereo channels are actively combined to mono there is no discernible

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change in audio level or fidelity. Full mix and secondary audio tracks should be phase coherent (synchronized) to prevent difficulty editing between these tracks, as necessary.

**Audio Levels:** Audio levels are evaluated using three different measurements, audio signal peak, average loudness, and dialogue loudness (LeQ(A)). Program audio must adhere to DCI standards for all three measurements.

Peak audio levels are evaluated using a digital true-peak meter with a 0 millisecond rise response. Assuming a reference level of -20 dBFS, peak audio levels may not rise above -10 dBFS at any point during the program.

Average loudness levels are evaluated using digital meters calibrated to the RMS/VU ballistic with a 300 ms / 20 dB rise response, measuring the program's most frequent peaking RMS value during dialogue. Assuming a reference level of -20 dBFS (+4 dBu), RMS/VU levels should consistently fall between -28 dBFS and -20 dBFS during the majority of the program, and never rise above -17 dBFS at any point during the program.

DCI also requires that program dialogue levels be analyzed using a Dolby LM100 broadcast loudness meter. The LM100 tool allows for dialogue to be measured distinctly and provides a reference for how loud spoken language will "sound" to the home viewer. When measured on a LM100 meter, dialogue levels should read between -26 dBFS and -28 dBFS as an average for the entire program using the infinite term measurement mode with the Dialogue Intelligence function enabled. Dialogue levels should also be consistent throughout the program, with short term dialogue measurements measuring between two dB above and four dB below the long-term dialogue level average.

For monaural programs, the dialogue level score may need to be measured differently. When measuring a single channel of audio on the LM100 meter, the dialogue level score will be 3 dB lower than if the same signal was doubled onto two tracks and measured as a stereo signal. Consequently, the dialogue level standards for these tracks are also 3 dB lower to compensate for the measurement change. The table below outlines the DCI audio standards for all audio track types.

Track Type	Average audio levels (RMS/VU)	Peak audio levels (Digital True Peak)	Dialogue Level (LM100 LeQ(A))
Full Mix (Stereo or Dual Mono)	-28 to -20 dBFS	Not above -10 dBFS	-26 to -28 dBFS
Full Mix (Single Channel Mono)	-28 to -20 dBFS	Not above -10 dBFS	-29 to -31 dBFS
Surround Sound Mix Tracks	-28 to -20 dBFS	Not above -3 dBFS	-26 to -28 dBFS
Element Tracks (Music, Effects, Mix minus Narration, Dialogue, Narration)	-28 to -20 dBFS	Not above -3 dBFS	Unrestricted

**Audio compression:** Program audio should have good dynamic range, but not be overly dynamic. While some compression may be needed to control the dynamic range of the program audio, excessive audio compression of the final mix should be avoided. While excessive compression can make the dialogue "cut" through the mix, it can also result in transmission problems, as secondary compression may be applied by the MSO. Excessive signal compression will also impact the LM100 Dialogue Level score of the program. Audio signal peaks, as measured using the digital true peak ballistic, should be approximately 10 to 12 db above program RMS levels.

## NTSC TECHNICAL REQUIREMENTS

### NTSC VIDEO SPECIFICATIONS:

**Tape Leader:** Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows:

Starting Code	Ending Code	Duration	Video	Audio
00:58:30:00	00:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 khz on channels 1 and 2, reference tone of 400 hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to -20 dBfs)
00:59:30:00	00:59:35:00	00:05:00	Black	Silence
00:59:35:00	00:59:50:00	00:15:00	Program Slate (see details below)	Silence
00:59:50:00	00:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
00:59:58:00	01:00:00:00	00:02:00	Black	Silence
1:00:00:00			Program begins	Program begins

**Vertical blanking** should adhere to SMPTE specification 170 M.

Discovery will accept vertical blanking that falls between 17 and 22 scan lines when measured as a composite NTSC signal.

**Horizontal blanking** should adhere to SMPTE specification 170 M

## DCI TECHNICAL SPECIFICATIONS

Discovery will accept horizontal blanking widths of between 10.4 and 12.0 microseconds, with a front porch measurement of 1.0 to 2.0 microseconds and a distance of 9.4 to 10.0 microseconds from the falling edge of sync to the end of the horizontal blanking. For NTSC programs, Discovery measures the start of blanking as the edge of the signal crosses below 7.5 IRE, and the end of blanking as the signal crosses above 7.5 IRE. Black edges on the image will be measured as program blanking, and may result in blanking measurements being wide.

Composite video white levels should not exceed 100 IRE units, and program black levels should not extend below 7.5 IRE units. Neither the program luminance whites nor blacks should be clipped excessively.

Composite chroma levels should not exceed 120 IRE when measured in the composite color space using a waveform monitor with a flat filter. Illegal levels may be clipped to prevent transmission over modulation, resulting in a loss of color fidelity and detail. Discovery standards do not distinguish between shows of digital component origination or those of composite origination when evaluating encoded chrominance levels. If digital production methods are used, it is the responsibility of the production company to ensure that the encoded signal meets the composite guidelines. All programs will be judged against these analog composite guidelines, irrespective of their native origination.

### Program Text Title Safe

Program text should be kept in the text safe area as defined in SMPTE RP 218. For NTSC (525) signals, the safe title area is the central 80% of the picture, an area of 576 by 384 pixels beginning 72 pixels from the left edge and 47 pixels from the top of the image and ending 648 pixels from the left edge and 432 pixels from the top of the image.

### ASPECT RATIO GUIDELINES:

Images acquired in the 16:9 aspect ratio must be protected for 14:9 viewing.

**16:9 NTSC Letterbox:** 181 scan lines, picture starts at line 50 and letterbox ends at 233

### NTSC TIMECODE SPECIFICATIONS:

Time code – **SMPTE Dropframe time code is mandatory.** Program start time code must read 01:00:00:00. Time code should be continuous, without error, and contain the appropriate flagging information in adherence with SMPTE specification 12 M. All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) **must** match exactly. **VITC must be placed on lines 16 and 18 of the NTSC vertical blanking signal.**

## PAL TECHNICAL REQUIREMENTS

### PAL VIDEO SPECIFICATIONS:

Tape Leader: Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows:

Starting Code	Ending Code	Duration	Video	Audio
09:58:30:00	09:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 khz on channels 1 and 2, reference tone of 400 hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to -20 dBfs)
09:59:30:00	09:59:35:00	00:05:00	Black	Silence
09:59:35:00	09:59:50:00	00:15:00	Program Slate (see details below)	Silence
09:59:50:00	09:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
09:59:58:00	10:00:00:00	00:02:00	Black	Silence
10:00:00:00			Program begins	Program begins

Vertical blanking should fall within EBU specifications, adhering to the ITU-R standard BT.470-6. Discovery will accept programs with vertical blanking measurements of between 23 and 26 scan lines.

Horizontal blanking should fall within EBU specifications, adhering to the ITU-R standard BT.470-6. Discovery will accept horizontal blanking widths of between 11.5 and 13.0 microseconds, with a front porch measurement of 1.0 to 2.0 microseconds and a distance of 10.5 to 11 microseconds from the falling edge of sync to the end of the horizontal blanking. For PAL programs, Discovery measures the start of blanking as the edge of the signal crosses below 0 millivolts and the end of blanking as the signal rises above 0 millivolts. Black edges on the image will be measured as program blanking, and may result in blanking measurements being wide.

## DCI TECHNICAL SPECIFICATIONS

**Time code – EBU Time code is mandatory.** Program start time code must read 10:00:00:00. Time code should be continuous, free of errors, and contain all appropriate flagging bits. All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) **must** match exactly. **VITC must be placed on lines 19 and 21 of the PAL vertical blanking signal.**

Composite video white levels should not exceed 700 mv, and program black levels should not extend below 0 mv. Program white and black levels should not be clipped excessively.

Composite chroma levels should not exceed 840 mv and may be clipped to prevent transmission over modulation. Discovery standards do not distinguish between shows of digital component origination or those of composite origination when evaluating encoded chrominance levels. If digital production methods are used, it is the responsibility of the vendor to ensure that the encoded signal meets the composite guidelines. All programs will be judged against these analog composite guidelines, irrespective of their native origination. PAL composite gamut legality is also required of all programs, irrespective of origination.

### Program Text Title Safe

Program text should be kept in the text safe area as defined in SMPTE RP 218. For PAL (625) signals, the safe title area is the central 80% of the picture, an area of 576 by 460 pixels beginning 72 pixels from the left edge and 58 pixels from the top of the image and ending 648 pixels from the left edge and 518 pixels from the top of the image.

### ASPECT RATIO GUIDELINES WHEN DELIVERING LETTERBOX FORMATS:

16:9 PAL Letterbox: 216 scan lines, picture starts at line 58, ends at 275

Images acquired in the 16:9 aspect ratio must be protected for 14:9 viewing.

# DCI GLOBAL TECHNICAL SPECIFICATIONS

## **GENERAL TECHNICAL REQUIREMENTS FOR HD**

### **HIGH DEFINITION VIDEO REQUIREMENTS:**

Video Footage should be acquired using formats acceptable to DCI on professional-quality media. Productions may be photographed using any of the following formats:

<b>High Definition Formats</b>	<b>Acceptable Upconversion Formats</b>	<b>Film Formats</b>
Sony HDCAM	Sony Digital Betacam	35 mm Film
Sony HDCAM SR	Sony Betacam SP	70 mm Film (IMAX)
Panasonic DVC PRO 100 mb (HD)	Sony MPEG IMX 50 mb (tape)	
Panasonic HD-D5 (Film Transfers)	Sony MPEG IMX 50 mb (XDCAM)	
HDV at 1080i (With Restrictions)	Panasonic DVC PRO 50 (tape)	
Sony XDCAM HD (35 mbps only)	Super 16 mm film	

Material not acquired in one of the acceptable formats must be approved by the Production Manager prior to the commencement of production. No more than 25% of an HD production's final content may be material upconverted from standard definition, and no more than 15% of the final content may be originated in the HDV 1080 format. When both HDV and upconverted materials are used in a program, the combined total of HDV and upconverted footage cannot exceed 30% of the final program material.

Video program material shall be produced using industry standard and accepted norms good practice and workmanship. DCI requires that its production partners use only selected codecs and media types when working in non-linear editing systems. Systems that use uncompressed HDSDI are acceptable, as are systems use the native codecs for the DVCPRO HD and HDCAM formats. Systems that exclusively use HDV codecs or are incapable of using HD-resolution media are not acceptable for online output. If there are questions about the qualifications of a particular editing system or type of media, please contact the DCI Technical Standards and Operations group.

#### **Acceptable Editing Codecs**

<i>Codec</i>	<i>Bit rate or Ratio</i>
Uncompressed SMPTE 292	1200 mbps
AVID DnX HD 8 and 10 bit	220 mbps or 145 mbps
Sony HDCAM codec	140 mbps
DVCPRO HD	100 mbps

#### **Unacceptable Editing Codecs**

<i>Codec</i>	<i>Bit rate or Ratio</i>
HDV (exclusive use)	25 mbps
Any Exclusively Standard Definition Codec	Various

Master and source videotapes must meet industry standard or industry-accepted standards for tape format interchange. All tapes should be recorded on VTRs that have been maintained in compliance with the manufacturer instructions and have been accurately calibrated per the manufacturer specifications.

#### **DCI Bug Clearance Specifications:**

DCI requires that lower third and other graphic elements containing text not interfere with the network ID keyed over the signal. Consequently, the following areas of the picture may not contain text information. All horizontal measurements are given in microseconds, with the start of the measurement at the SAV reference pulse.

No text shall fall into the space between 21 microseconds and 24.5 microseconds between lines 459 and 541 (field 1) in a 1080 I 59.94 signal. Broadcast resolution TIF files outlining the bug safe area for 1080 interlaced and other HD formats will be provided on request.

Video white levels should not exceed 700mV for component signals, and program black levels should not extend below 0 Vdc. Neither the program luminance whites nor blacks should be clipped excessively. For color difference signals R-Y and B-Y, levels shall not exceed 700 mV or fall below 0 mV when set at a 350 mV offset.

#### **Program Text Title Safe**

Program text should be kept in the text safe area as defined in SMPTE RP 218. For 1080 line signals, the safe title area is the central 80% of the picture, an area of 1536 by 864 pixels beginning 192 pixels from the left edge and 108 pixels from the top of the image and ending 1728 pixels from the left edge and 972 pixels from the top of the image.

### **HIGH DEFINITION AUDIO REQUIREMENTS:**

Audio program material shall be produced using industry standard and accepted norms for good practice and workmanship. The audio portion of the master and source audio and videotapes must be produced so that no noise, static, dropouts or extraneous distortion is recorded in the audio. The audio mix should also be well balanced and equalized, with dialogue and narration clearly able to be heard.

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**Audio channels - *Stereo audio must be fully mono compatible.*** The audio channels must be in the proper phase. NOTE: Full Mono Compatibility means that when the left and right stereo channels are actively combined to mono there is no discernible change in audio level or fidelity. Full mix and split audio tracks should be phase coherent (synchronized) to prevent difficulty editing between these tracks, as necessary.

**Audio Levels:** Audio levels are evaluated using three different measurements, audio signal peak, average loudness, and dialogue loudness (LeQ(A)). Program audio must adhere to DCI standards for all three measurements. Peak audio levels are evaluated using a digital true-peak meter with a 0 millisecond rise response. Assuming a reference level of -20 dBFS, peak audio levels may not rise above -10 dBFS at any point during the program.

Average loudness levels are evaluated using digital meters calibrated to the RMS/VU ballistic with a 300 ms / 20 dB rise response, measuring the program's most frequent peaking RMS value during dialogue. Assuming a reference level of -20 dBFS (+4 dBu), RMS/VU levels should consistently fall between -28 dBFS and -20 dBFS during the majority of the program, and never rise above -17 dBFS at any point during the program.

DCI also requires that program dialogue levels be analyzed using a Dolby LM100 broadcast loudness meter. The LM100 tool allows for dialogue to be measured distinctly and provides a reference for how loud spoken language will "sound" to the home viewer. When measured on a LM100 meter, dialogue levels should read between -26 dBFS and -28 dBFS as an average for the entire program using the infinite term measurement mode with the Dialogue Intelligence function enabled. Dialogue levels should also be consistent throughout the program, with short term dialogue measurements measuring between two dB above and four dB below the long-term dialogue level average.

For monaural programs, the dialogue level score may need to be measured differently. When measuring a single channel of audio on the LM100 meter, the dialogue level score will be 3 dB lower than if the same signal was doubled onto two tracks and measured as a stereo signal. Consequently, the dialogue level standards for these tracks are also 3 dB lower to compensate for the measurement change. The table below outlines the DCI audio standards for all audio track types.

Track Type	Average audio levels (RMS/VU)	Peak audio levels (Digital True Peak)	Dialogue Level (LM100 LeQ(A))
Full Mix (Stereo or Dual Mono)	-28 to -20 dBFS	Not above -10 dBFS	-26 to -28 dBFS
Full Mix (Single Channel Mono)	-28 to -20 dBFS	Not above -10 dBFS	-29 to -31 dBFS
Surround Sound Mix Tracks	-28 to -20 dBFS	Not above -3 dBFS	-26 to -28 dBFS
Element Tracks (Music, Effects, Mix minus Narration, Dialogue, Narration)	-28 to -20 dBFS	Not above -3 dBFS	Unrestricted

**Audio compression:** Program audio should have good dynamic range, but not be overly dynamic. While some compression may be needed to control the dynamic range of the program audio, excessive audio compression of the final mix should be avoided. While excessive compression can make the dialogue "cut" through the mix, it can also result in transmission problems, as secondary compression may be applied by the MSO. Excessive signal compression will also impact the LM100 Dialogue Level score of the program. Audio signal peaks, as measured using the digital true peak ballistic, should be approximately 10 to 12 db above program RMS levels.

**Audio Track Assignment and Mix Guidelines:** For 5.1 surround sound mixes all narration elements should be confined to the center channel to allow for easy removal for language customization. Spoken language elements such as interviews and voiceover should be limited to the front left and right channels. Only music and effects should be present on the left and right rear surround channels. This allows the 5.1 English full mix to serve a triple purpose of a 5.1 mix minus narration (when center track is removed), and a 5.1 Music and Effects mix when the center, front left and front right channels are removed. While this places some restrictions on track bleed in the 5.1 mix, it allows DCI to limit the audio deliverables to twelve channels for international surround sound delivery.

## DCI GLOBAL TECHNICAL SPECIFICATIONS

### 1080 I 59.94 TECHNICAL SPECIFICATIONS

#### 1125 LINE/ 59.94 HZ LINE RATE INTERLACE HIGH DEFINITION VIDEO SPECIFICATIONS:

All video shall conform to SMPTE 274M, “1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates” and SMPTE240M, “Signal Parameters – 1125- line High Definition Productions Systems” broadcast standards. All video information must be compliant with either SMPTE 260M, “1125/60 High-Definition Production System – Digital Representative and Bit-Parallel Interface”, or SMPTE 292M “Bit –Serial Digital Interface for High-Definition Systems.

Master and source videotapes must meet industry standard or industry accepted standards for tape format interchange. Source tapes may be either HD Cam or HD D5, at the 1080 interlace 59.94 Hz line rate. If acquisition is made by film stock, 35mm film with an aspect ratio of 1.77(16 x 9) is required.

Video shall adhere to SMPTE 274m, item 5 of table 1, which outlines 1920x1080 interlace at a frame rate of 59.94 Hz. 1035 line material is not acceptable for newly shot pieces.

Tape Leader: Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows:

Starting Code	Ending Code	Duration	Video	Audio
00:58:30:00	00:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 khz on channels 1 and 2, reference tone of 400 hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to –20 dBfs)
00:59:30:00	00:59:35:00	00:05:00	Black	Silence
00:59:35:00	00:59:50:00	00:15:00	Program Slate (see details below)	Silence
00:59:50:00	00:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
00:59:58:00	01:00:00:00	00:02:00	Black	Silence
1:00:00:00			Program begins	Program begins

Vertical blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in ITU-R specification BT.709-4. The vertical blanking interval should equal lines 1-20 and lines 561-563 of the first field and lines 564-583 and lines 1124-1125 in the second field.

Horizontal blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and ITU-R specification BT.709-4. Horizontal blanking should be between 280 clock periods and a maximum of 292 clock periods, creating a blanking width of between 3.775 microseconds and 3.935 microseconds when a clock period is equal to 13.48 nanoseconds.

Timecode – SMPTE Dropframe timecode is mandatory. Time code shall adhere to SMPTE 12M, “Time and Control Code”. Program start time code must read 01:00:00:00. Time code should be continuous and free of errors, containing all appropriate flagging bits.

All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) must match exactly.

### 1080 P 23.98 TECHNICAL SPECIFICATIONS

#### 1125 LINE/ 23.98 HZ LINE RATE PROGRESSIVE HIGH DEFINITION VIDEO SPECIFICATIONS:

All video shall conform to SMPTE 274M, “1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates” and SMPTE240M, “Signal Parameters – 1125- line High Definition Productions Systems” broadcast standards. All video information must be compliant with either SMPTE 260M, “1125/60 High-Definition Production System – Digital Representative and Bit-Parallel Interface”, or SMPTE 292M “Bit –Serial Digital Interface for High-Definition Systems.

Master and source videotapes must meet industry standard or industry accepted standards for tape format interchange. Source tapes may be either HD Cam or HD D5, at the 1080 progressive 23.98 Hz line rate. If acquisition is made by film stock, 35mm film with an aspect ratio of 1.77(16 x 9) is required.

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Video shall adhere to the specifications provided in SMPTE 274m , item 11 of table 1, which outlines 1920x1080 progressive scan at a frame rate of 23.98 Hz.

Tape Leader: Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows:

Starting Code	Ending Code	Duration	Video	Audio
00:58:30:00	00:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 khz on channels 1 and 2, reference tone of 400 hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to -20 dBfs)
00:59:30:00	00:59:35:00	00:05:00	Black	Silence
00:59:35:00	00:59:50:00	00:15:00	Program Slate (see details below)	Silence
00:59:50:00	00:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
00:59:58:00	01:00:00:00	00:02:00	Black	Silence
1:00:00:00			Program begins	Program begins

Vertical blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in ITU-R specification BT.709-4. The vertical blanking interval should equal lines 1-41 and lines 1122-1125 in this progressive scanning format.

Horizontal blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in ITU-R specification BT.709-4. Horizontal blanking should be between 830 clock periods and a maximum of 842 clock periods.

Timecode – SMPTE timecode is mandatory. Time code shall adhere to SMPTE 12M, “Time and Control Code”. Program start time code must read 01:00:00:00. Time code should be continuous and free of errors, containing all appropriate flagging bits. All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) must match exactly.

### 1080 P 25 TECHNICAL SPECIFICATIONS

#### 1125 LINE/ 25 HZ LINE RATE PROGRESSIVE HIGH DEFINITION VIDEO SPECIFICATIONS:

**All video shall conform to SMPTE 274M, “1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates” and SMPTE240M, “Signal Parameters – 1125- line High Definition Productions Systems” broadcast standards. All video information must be compliant with either SMPTE 260M, “1125/60 High-Definition Production System – Digital Representative and Bit-Parallel Interface”, or SMPTE 292M “Bit –Serial Digital Interface for High-Definition Systems.**

Master and source videotapes must meet industry standard or industry accepted standards for tape format interchange. Source tapes may be either HD Cam or HD D5, at the 1080 progressive 25 Hz line rate. If acquisition is made by film stock, 35mm film with an aspect ratio of 1.77(16 x 9) is required.

Video shall adhere to SMPTE 274m , item 9 of table 1, which outlines 1920x1080 progressive scan at a frame rate of 25 Hz. 1035 line material is not acceptable for newly shot pieces.

Tape Leader: Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows:

Starting Code	Ending Code	Duration	Video	Audio
00:58:30:00	00:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 khz on channels 1 and 2, reference tone of 400 hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to -20 dBfs)
00:59:30:00	00:59:35:00	00:05:00	Black	Silence
00:59:35:00	00:59:50:00	00:15:00	Program Slate (see details below)	Silence
00:59:50:00	00:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval

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00:59:58:00	01:00:00:00	00:02:00	Black	Silence
1:00:00:00			Program begins	Program begins

Vertical blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in ITU-R specification BT.709-4. The vertical blanking interval should equal lines 1-41 and lines 1122-1125 in this progressive scanning format.

Horizontal blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in ITU-R specification BT.709-4. Horizontal blanking should be between 714 clock periods and a maximum of 726 clock periods.

All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) **must** match exactly.

### **1080 I 50 TECHNICAL SPECIFICATIONS**

#### **1125 LINE/ 50 HZ LINE RATE INTERLACE HIGH DEFINITION VIDEO SPECIFICATIONS:**

All video shall conform to **SMPTE 274M, “1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates”** and **SMPTE240M, “Signal Parameters – 1125- line High Definition Productions Systems”** broadcast standards. All video information must be compliant with either **SMPTE 260M, “1125/60 High-Definition Production System – Digital Representative and Bit-Parallel Interface”**, or **SMPTE 292M “Bit –Serial Digital Interface for High-Definition Systems.**

Master and source videotapes must meet industry standard or industry accepted standards for tape format interchange. Source tapes may be either HD Cam or HD D5, at the 1080 interlace 50 Hz line rate. If acquisition is made by film stock, 35mm film with an aspect ratio of 1.77(16 x 9) is required.

Video shall adhere to SMPTE 274m, item 6 of table 1, which outlines 1920x1080 interlace at a frame rate of 50 Hz. 1035 line material is not acceptable for newly shot pieces.

Tape Leader: Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows:

Starting Code	Ending Code	Duration	Video	Audio
00:58:30:00	00:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 khz on channels 1 and 2, reference tone of 400 hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to -20 dBfs)
00:59:30:00	00:59:35:00	00:05:00	Black	Silence
00:59:35:00	00:59:50:00	00:15:00	Program Slate (see details below)	Silence
00:59:50:00	00:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
00:59:58:00	01:00:00:00	00:02:00	Black	Silence
1:00:00:00			Program begins	Program begins

Vertical blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in ITU-R specification BT.709-4. The vertical blanking interval should equal lines 1-20 and lines 561-563 of the first field and lines 564-583 and lines 1124-1125 in the second field.

Horizontal blanking should fall within SMPTE 274M specifications, as stated in section 14 “Analog Synch” and section 15 “Analog Interface” and in table 4 of the “Analogue Representation” section of ITU-R specification BT.709-4. Horizontal blanking should be between 280 clock periods and a maximum of 292 clock periods, creating a blanking width of between 3.775 microseconds and 3.935 microseconds when a clock period is equal to 13.48 nanoseconds.

Timecode – EBU 25-frame timecode is mandatory. Time code shall adhere to **SMPTE 12M, “Time and Control Code”**. Program start time code must read 01:00:00:00. Time code should be continuous and free of errors, containing all appropriate flagging bits.

All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) **must** match exactly.