

Technical Recommendations

CST - RT – 017 – TV – v3.0 - 2011

Technical Recommendations for “Ready For Broadcast” Broadcasters (CST/FICAM/HDFORUM)

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1/ PURPOSE

1.1 PRELIMINARY STATEMENT

This document was published further to the joint project conducted by the HDForum broadcasters, the CST and the FICAM. It defines the standards common to the various Broadcasters with regard to the type of audio / video / metadata signals that must be observed when “ready-for-broadcast” content is delivered. Indeed, it is a reference but in no way excludes the addition of any of the Broadcaster’s specificities

1.2 SCOPE OF THIS DOCUMENT, CONDITIONS UNDER WHICH MODIFICATIONS MAY BE MADE

The scope of this document is restricted to the description of audio and SD / HD video signals. It constitutes a mutualisation stage for RFB Broadcaster recommendations.

For audio and video technical specifications, the scope of this document is applicable to all program elements delivered to Broadcasters : trailers, sponsorship, TV movies, documentaries, series, jingles, advertisings, feature films, short films, lives broadcast, entertainment shows, magazines, etc.

The requirements of Broadcasters concerning the content and nature of delivery media are not mentioned in this document, except for identification signals, because it was decided that these should be specifically defined by each Broadcaster depending on their own requirements and the contractual framework specific to each channel and each programme.

The amendment of these recommendations (by increments to the version number) takes place according to the type and nature of the modifications made to this document. Considering that the version number is in the form A.B:

- A will change in increments of 1 in the event of the addition of major functional modifications affecting the product delivered
- B will change in increments of 1 in the event of corrections, additional specifications etc.

Any amendments to this document must be validated by all the parties who took part in drafting this version.

1.3 TYPOGRAPHICAL RULES:

Text in italics indicates:

- Recommendations on subjective values relying on common sense on everybody’s part.
- Paragraph titles in levels 3 and 4
- Denominations in Metadata fields.

Bold text indicates:

- Paragraph titles
- References to other standard documents or recommendations whose content must necessarily be observed within the framework of this document
- Elements to which particular attention must be paid by all parties for various reasons (e.g. new elements in the standard entailing changes to customary work procedures).

1.4 REFERENCES OF STANDARDS AND RECOMMENDATIONS USED IN THIS DOCUMENT :

Video :

- ITU-R BT.601 : SD video encoding parameters <http://www.itu.int>
- ITU-R BT.709 : HD video encoding parameters
- EBU-R103 2000 : Tolerance for illegal colours <http://www.ebu.ch>
- EBU-R92 1999 : 625/50 active image zone
- SMPTE 274M : 1920x1080 HD signal parameters <http://www.smpite.org>
- SMPTE 291M : Ancillary data
- SMPTE RP-12 revised 3 (replaces RP 188): ANC Time Code and Data

Audio :

- ITU-R BS.1770-2: Leq RLB audio measurement algorithms
- ITU-R BS.775 : Layout of 5.1 speakers
- UER-R91-1998 : Allocation of channels for 5.1 audio
- EBU-R128: Loudness normalisation and permitted maximum level of audio signal
- EBU-Tech 3341, 3342, 3343, 3344
- EBU Tech 3304 : 5.1 audio test signals
- SMPTE 299M : 24-byte audio for HD TV
- IEC 60268-5 : Audio listening
- CST-RT 016-TV : Dialogue level measurement method

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3/ TECHNICAL SPECIFICATIONS FOR RFB SIGNALS

A.1 – TECHNICAL SPECIFICATIONS FOR VIDEO

A.1.1 - SD VIDEO SIGNAL

A.1.1.1 – Manufacturing norm

SD video signals should comply with the following standards and recommendations:

- ITU-R BT.601: SD video encoding parameters
- EBU-R103 2000: Tolerance for illegal colours (N.B. : Measurements carried out with Low Pass Filter activated)
- EBU-R92 1999: 625/50 active image zone

The signal must never transit through the composite field.

A.1.1.2 – Vertical elimination

The following table specifies the vertical positioning of active lines in the video signal depending on the image format. A tolerance of +/- 2 lines is permitted.

Image format	Video 4/3			Video 16/9		
	Start line	End line	Number of lines	Start line	End line	Number of lines
1,33	24	310	287	-	-	-
1,37	28	306	279	-	-	-
1,55	44	290	246	-	-	-
1,66	52	281	230	24	310	287
1,77	59	274	216	24	310	287
1,85	64*	270*	207*	29*	304*	276*
2,35	86*	247*	162*	59*	274*	216*

* This value may be altered in the event of a specific re-framing request validated by the beneficiary(ies)

In the case of a Full Height Anamorphic 16/9 image, the measurements will be taken for an image in a correctly centred 1.66 : 1 format

- Between the SAV and the start of the usable signal: 2.4µs
- Between the end of the usable signal and EAV : 2.3µs

The cumulated tolerance permitted for these measurements is 0.2µs

Unless the Broadcaster specifies otherwise, lines 23 and 623 cannot carry a video signal or data.

A.1.1.3 – Metrological specifications

As well as the stipulations set out in standard EBU R 103-2000, the following table specifies the electric levels of the target values for the tolerance permitted by Broadcasters with regard to the electric level of SD video components:

Colorimetric area	RGB	Y_{PrPb} for luminance
<i>Electricity level (Y)</i>	700mV	700mV
<i>Upper levels (Y max)</i>	+ 5% soit 735 mV	+ 3% soit 721 mV
<i>Lower levels (Y min)</i>	- 5% soit -35 mV	- 1% soit -7 mV
<i>Spatial tolerance</i>	1% As long as 1% of the active image pixels is not higher than this	1% As long as 1% of the active image pixels is not higher than this

A.1.2 - HD VIDEO SIGNAL

A.1.2.1 Manufacturing norm

4 :2 :2 HD 1080/50i1 standard in 16/9 format

The HD video signal should comply with the following standards and recommendations:

- **SMPTE 274M : HD 1920x1080 signal parameters**
- **ITU-R BT.709 : HD video encoding parameters**

The video signal matches the 1080/50i characteristics of these standards, whatever the format of the original video signal. 1080/25p and 1080/25PsF are forbidden.

N.B. : in no way does this exclude production and post-production in the above formats.

A.1.2.2 – Vertical elimination

The following table specifies the vertical positioning of the active lines in the video signal depending on the image format. A tolerance of +/- 2 lines is permitted:

Image format	16/9 video only		
	start line	end line	number of lines
1,33	21	560	540
1,37	21	560	540
1,66	21	560	540
1,77	21	560	540
1,85	32*	550*	519*
2,35	87*	495*	408*

* This value may be altered further to specific re-framing requests validated by the beneficiary(ies)

Horizontally, the SAV must therefore be immediately followed by useful content. A difference of 0.1 μ s between the SAV and the start of the useful content is tolerated. In any given programme, this difference – if there is one – should be constant throughout the programme.

¹ representative of the reference format at the time of the writing of this document. If this format is to be removed, a new version of this technical recommendations will be edited, regarding to the version notation.

A.1.2.3 – Metrological specifications

The table below lists the tolerance permitted by Broadcasters for electrical levels in HD video components.

The following measurements should be taken in both colorimetric areas (R, G, B and Y, Pr, Pb)

Colorimetric area	RVB	YPrPb for luminance
Electricity level	700mV	700mV
Top level	+3% i.e. 721 mV	+3% i.e. 721 mV
Lower level	-1% i.e. -7 mV	-1% i.e. -7 mV
Spatial tolerance	1% As long as 1% of the pixels in the active image is not higher than these levels	1% As long as 1% of the pixels in the active image is not higher than these levels

The use of different digital video compression ratios is necessarily shown on the label and on the technical identification form, specifying the compression type and the bit rate.

A.1.3 – SUBJECTIVE IMAGE QUALITY

- *The image must have a correct appearance with the video player's settings on "PRESET"*
- *For recent films, the images derived from a TV film must be free of scratches, dust, gelatine splashes, defects in the colorimetric correction trigger*
- *For older films, particular attention must be paid to dealing with defects in film and TV film copies*
- *As a general rule, the image must never have an excessive sound level, shiny defects, compression artefacts or faults due to the over-use of a noise-reduction process etc.*
- *The darkest scenes in the programme must - in all cases – be viewable in an acceptable quality when they are screened on a "general public" television. Black areas must not be stuck or squashed and details must remain visible in dark areas.*
- *Credits at the end of the programme must be legible on video.*

A.2 – AUDIO TECHNICAL SPECIFICATIONS

Paragraphs A.2.1, A.2.2, A.2.3 and A.2.4 describe the required specifications for each of the audio components.

AIMS

The pre-requisites used for drafting this document with regard to the constraints and aims of sound broadcast on television are as follows :

- Respecting the work, in particular concerning artistic choices
- Guaranteeing comfortable listening for viewers by means of perfectly intelligible sound in the various configurations (all multi-channel types including 5.1, down-mix, stereo, mono)
- Guaranteeing continuity of perception of sound in the sequence of different programmes
- Optimising the use of metadata inherent to Dolby Digital and Dolby Digital Plus codecs.

GENERAL CONSIDERATIONS

Any work done to make mixed sound tracks comply with the clauses of this recommendation must be carried out under the authority of the beneficiaries or by a service provider appointed or empowered by them. The work done must be considered satisfactory by everyone involved (producer, post-producer, editors).

The use of solutions that include the dynamic compression of the signal must not result in constant energy levels without any “aeration” of the sound signal over time.

UNITS

LUFs means Loudness Unit on the Full Scale. A LUFs value is the expression of a weighted measurement, K (Leq(R2LB)) on a Full Scale.

The LUFs scale is graduated in steps of 1 dB. Applying an increase of 1 dB to the measured signal results in an increase of + 1 dB in the reading on the LUFs scale.

CONDITIONS FOR LISTENING AND MIXING

These sound tracks must be mixed in an auditorium where the technical equipment and dimensions are suitable for television sound (close-up listening). For example, large cinema-type auditoria are not suitable for this kind of mixing and they are therefore not advised.

The definition of the sound level for the “validation” of sound levels in RFB programmes in a quality check room can be found in the clauses of recommendations EBU-Tech 3276 and 3276 s1.

The mixer may adjust the sound level (SPL acoustic pressure level) validated with reference pink noise (EBU Technical Recommendation R68) depending on the proposed hall and sound system, in the region of 79 dB (C) per channel (not including LFE).

A.2.1 – CONDITIONS FOR MEASURING SOUND AND LISTENING

A.2.1.1 - Types of speakers and their position

Audio mixing, mastering, encoding and quality control devices must be fitted with speakers that comply with standard **IEC 60268-5**.

The position of the speakers must comply with standard **ITU-R BS.775**.

A.2.1.2 – Calibration for listening

Sound devices must be calibrated according to the rules laid down in recommendation EBU Tech 3276 S1.

A.2.1.3 – Sound level

Programmes will be checked on sound systems whose line-up level - for pink noise broadcast at -18dBFS - is 74 dB (C) SPL on every channel except the LFE channel, which is broadcasted at 78 dB (C) SPL.

This level is considered to be the one at which the overall dynamic range and the intelligibility of speech and timbre are deemed to comply with television broadcast levels.

A.2.1.4 – Measuring levels

Peak levels : Levels are checked using a virtually instantaneous “peak meter, the “True Peak”.

Current recommendation:

- **SMPTE 299M** : “24-Bit Digital Audio Format for SMPTE 292 M Bit-Serial Interfaces”.
- **AES** : Definition of the True Peak and the Sample Peak (see ITU BS 1770-2)

Loudness

History

Further to the work carried out since 2000 within the framework of FICAM / CST work groups on listening comfort and sound level, completed by the work done by the CST's Sound department and the HD Forum ; we propose a method for measuring loudness which allows us to validate the value of this level for all programme type intended for television broadcast, whatever format they are in (PCM, Dolby E, etc.) and whatever the type of mixing (multi-channel, stereo, mono, etc.)

This value will also allow us to inform any metadata if encoding is used.

Metering method

The metering method we use consists of measuring the whole of the useful programme using a device that implement the algorithm described in recommendation R 128 published by EBU, as well as its appendices 3341, 3342, 3343 and 3344, producing a value given in dB LUFS.

Current recommendations

- **ITU-R-BS.1770-1 and 1770-2** : Algorithms for measuring a programme's sound energy levels and “true peak” audio levels,
- **EBU R 128** : Loudness normalisation and permitted maximum level of audio signals,
- **EBU Tech Doc 3341** : “**Loudness Metering: EBU Mode**” metering to supplement loudness normalisation in accordance with EBU R 128,
- **EBU Tech Doc 3342** : “Loudness Range: a descriptor to supplement loudness normalisation in accordance with EBU R 128”
- **EBU Tech Doc 3343** : “Practical Guidelines for Production and Implementation in accordance with EBU R 128
- **EBU Tech Doc 3344** : “Practical Guidelines for Distribution Systems in accordance with EBU R 128”,
- **ITU-R: BS 775** : Positioning of loudspeakers for 5.1 listening.

A.2.2 – CHARACTERISTICS OF SIGNALS

It is understood that instantaneous measurements taken of signals must never exceed the maximum level permitted of 0dBTP (no clips permitted).

A.2.2.1 – Line-up level

The line-up level reading on a Full Scale digital peak meter is -18dB FS for a sinusoidal signal at a frequency of 1000Hz.

A 1000 Hz line-up signal at -18 dBFS should display a loudness level of -18 LUFS on a metering device in EBU mode, if the signal is present on the left and right channels of a stereo or 5.1 programme.

If the signal is present on one channel only, the displayed level will be -21 LUFS.

As a reminder, in analogue sound : the line-up level reading on PPM quasi-peak 10 ms DIN 45406 is -9 dB and the line-up level reading is 0 Vu on a Vu meter.

A.2.2.2 – Maximum peak level in programmes (PCM or Dolby E)

Mixing : The peak level for audio signals measured using True Peak, must not exceed -3 dB TP.

A.2.2.3 - Dynamics

A.2.2.3.1 – Loudness target value over the whole programme

Whatever type of mixing is used, the loudness target value for the whole programme is as follows:

For programmes longer than 2'00 (2 minutes):

- 23 LUFS with a tolerance of ± 1 LU

For programmes shorter than 2'00 (2 minutes):

- 23 LUFS (silent programmes permitted)

A.2.2.3.2 – Dynamics Profile

Loudness excursions are permitted, measured as defined in § A.2.2.3.3 below, as follows:

For programmes longer than 2'00 (2 minutes):

For dialogues:

± 7 LU around the loudness target value, metered in the short term mode,

To make this measurement easier to meter, we may use a metering device that presents a graph history of the short-term loudness

Since the integration time of the short-term measurement is three seconds, the metering of the first three seconds of a dialogue period is not significant and should therefore be ignored.

LRA Loudness Range

The LRA value must be **less or equal to 20 LU** (see EBU Tech 3342)

N.B. We advise that it is good practice for the LRA value to be at least 5 LU to ensure aeration of the programme.

For programmes shorter than 2'00 (2 minutes):

For the whole programme :

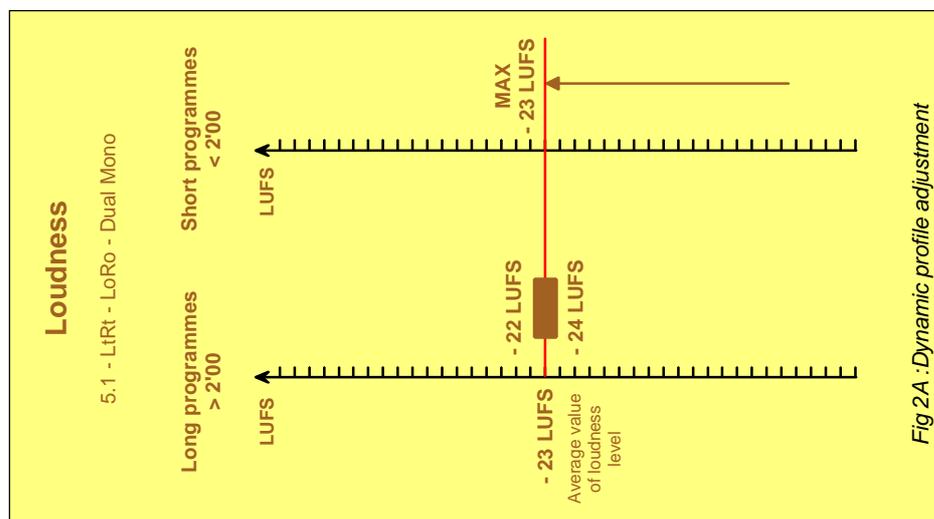
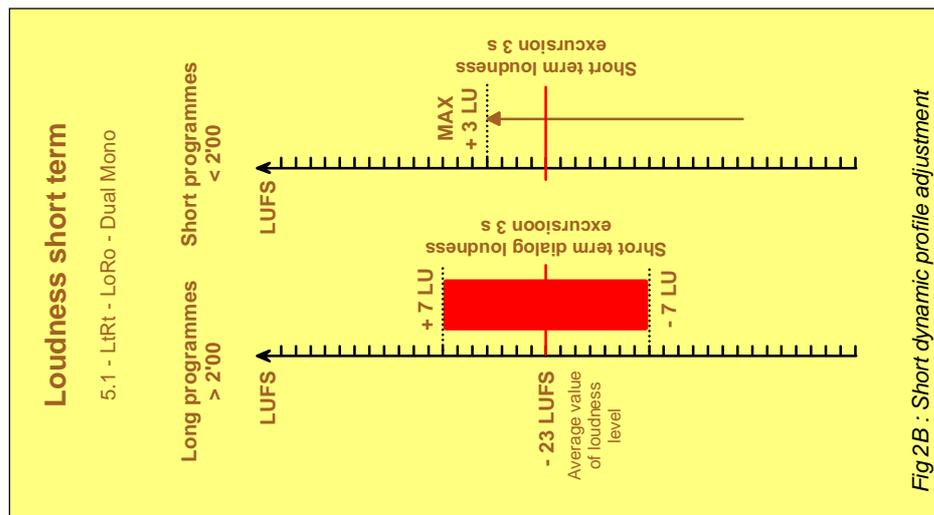
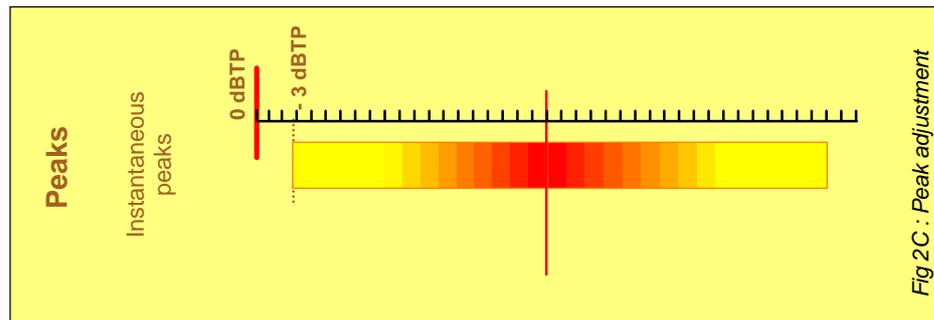
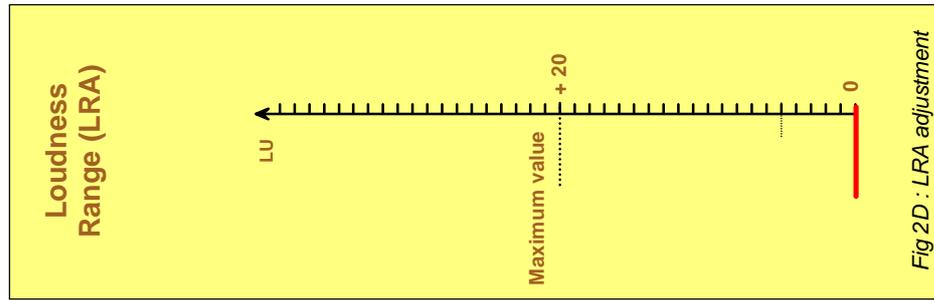
+ 3 LU max. metered in the short term mode, above the loudness target value

A.2.2.3.3 – Method for metering the dynamics (“short term loudness”)

The dynamic range of a programme is measured using tools that permit the energy level to be displayed over a “sliding” window of 3 seconds (in LUFS, weighting ITU-R BS 1770-2).

With regard to metering dialogues, an objective measurement will be taken in case if the quality check operator notices a lack of dialogue intelligibility during the control screening of the programme. Random measurements will be taken on elements of the dialogue in question.

2.2.3.4 – Synthetic Table



A.2.2.4 - Audio/video synchronisation

Video and audio signals are synchronous with the following tolerance:

- Either a maximum lead of sound compared to image of 20ms
- Or a maximum delay of sound compared to image of 40ms.

By default, tracks encoded using Dolby E must be recorded synchronously with video (In-sync).

This will result in a delay of 1 (one) audio image compared to the video, further to decoding using Dolby E without compensating the video delay.

A.2.2.5 – Digital Audio Format

Audio tracks must be delivered in the following digital format:

- Sampling frequency: 48kHz
- Linear quantification: minimum 16 bytes for PCM format; minimum 20 bytes compulsory for Dolby E format
- Dolby E signals must be exempt of CRC errors (Cyclic Redundancy Code)

A.2.3 – SUBJECTIVE QUALITY

The soundtrack must be naturally balanced and adjusted according to the current rules of the trade. When one listens in quiet environment on a sound system that has a flat frequency range, one should hear no artefacts: de-synchronisation clicks from clocks, whistles in speech, whines or wheezes in low frequencies (buzz).

Format conversions using speed variations (24/25 fps) generally require harmonisation in order to remain within the original musical tone. Harmonisation procedures on 5.1 signals are at the limits of current technology and in some cases they are terribly destructive.

Harmonisation is therefore a very delicate operation that must be authorised or advised-against by the mixer, or possibly performed by the mixer himself/herself.

A.2.4 – TECHNICAL INDICATIONS FOR MIXING AND ENCODING

Each delivery of a mixed soundtrack must be accompanied by a standardised “**Mixing information sheet**” as appended hereto as appendix 1.

Each RFB medium containing Dolby E tracks must be accompanied by a standardised « **Dolby E encoding sheet** » as appended hereto as appendix 2.

Parallel to this and at the request of the Broadcaster, these documents may be communicated electronically. Incomplete documentation may constitute grounds for refusal.

A.2.5 - SPECIFICITIES OF PCM FORMAT

A.2.5.1 - Mono

In monophonic broadcasts, the signal recorded using PCM is delivered on two contiguous audio tracks without digital bit rate compression.

In order for this to be compatible with stereo signals, the two tracks containing the monophonic signal are strictly identical and in time.

A.2.5.2 - Lo/Ro and Lt/Rt Stereo

A.2.5.2.1 – Assignment of tracks

In stereophonic broadcasts, the signal recorded using PCM is delivered on two contiguous audio tracks without digital bit rate compression.

The odd track is the left channel and the even track is the right channel.

A.2.5.2.2 – Audio phase

This is the average result between the left and right channel of an intensity and phase stereo.

To ensure the mono downmix is compatible, the phase must be mostly positive.

A.2.5.2.3 – Specificities for Lt/Rt Surround stereo signals

« Surround reductions (LCRS) → Lt/Rt stereo» must maintain spatial coherence of the sound image and must not alter the intelligibility or the timbre of the sound message.

Products derived from Lt/Rt Surround must in no event be decoded using LCRS to supply Dolby E channels in a 5.1 configuration. Moreover, they must not undergo decoding and Lt/Rt re-matrixing generation.

A.2.6 - SPECIFICATIES FOR DOLBY-E FORMAT

A.2.6.1 - Synchronisation of Dolby-E and video frames

The relative position of the start of the Dolby E frame and video must comply with the recommendations set out in the table below.

Video format	Start of Dolby E frame	Tolerance
SD	line 12	± 1 line
HD	line 20	± 3 lines

Gauging the relative position of the Dolby E and video frames may be carried out in the following manner :

- Measuring it using a specific device on the audio output of a VTR synchronised to the same reference as the measurement device.
- Measuring it using a specific device capable of detecting the position of the header of the Dolby E frame within an SDI train.

A.2.6.2 – Channels mapping

Dolby E coding takes into account 4 or 8 audio tracks depending on the following conditions :

- **Programme available only with monophonic or stereophonic sound** : Dolby-E coding is carried out in 2/0 configuration where the PCM version's monophonic sound is duplicated identically respectively on tracks 1 and 2 of the Dolby-E, and the PCM version's stereophonic sound is duplicated identically track for track on tracks 1 and 2 of the Dolby-E.

The specifications regarding the content of tracks 7 and 8 of the Dolby E are left at the discretion of the Broadcasters.

- **Programme available on 5 or 6 audio tracks mixed respectively in 5.0 or 5.1 format : Dolby-E coding is carried out in a 3/2 configuration depending on the assignment of tracks in recommandation UER-R91-1998**

Original AES pair	Dolby E track	Content
AES1 (tracks 1 et 2)	Track 1	Left track
	Track 2	Right track
AES2 (tracks 3 et 4)	Track 3	Centre track
	Track 4	Subwoofer track
AES3 (tracks 5 et 6)	Track 5	Left rear track
	Track 6	Right rear track
AES4 (tracks 7 et 8)	Track 7	Optional track A (Content to be specified by the Broadcaster)
	Track 8	Optional track B (Content to be specified by the Broadcaster)

This necessarily requires the compulsory configuration of metadata as follows:

- *Program Config = 5.1+2*
- Channel Mode = 3/2 for programme 1
- Channel Mode = 2/0 for programme 2
- Please refer to paragraph A.2.6.4 for the other parameters.

A.2.6.3 – Compatibility of stereo reduction (downmix)

Any « 5.1 => stereo » reduction - once the increase of gain and Lt/Rt or Lo/Ro matrixing have been applied in the metadata (paragraph A.2.6.4) - must:

- *Maintain the spatial coherence of the sound image*
- *Maintain the level and intelligibility of voices*
- *Maintain the balance between the various elements mixed*
- *Maintain the frequency balance of the mixing*

The characteristics of the stereo signal phase derived from a downmix must fulfil the same requirements as a traditional stereo signal (Cf. § A.2.5.2 Audio phase).

A.2.6.4 - Dolby E Metadata

A.2.6.4.1 - Typology of Multi-channel programmes (Music and Others)

We can distinguish two main typological categories of Multi-channel programmes (5.1 ou 5.0):

1. **Musical** programmes liable to cause problems in the event of a stereo downmix.
2. All other programmes that are not musical.

A.2.6.4.2 – Setting the Dialnorm loudness value

- The measurement should be taken according to the method described in recommendation EBU R128 (§ A.2.2)
- The exact value measured must be entered into the metadata.
- In the case of short programmes whose loudness value is below -23 LUFS (see § A.2.2), the actual value measured should be displayed.

A.2.6.4.3 – Metadata corresponding to 5.1 / 5.0 / 2.0 programmes

We can distinguish three different categories of Dolby-E metadata to be entered during the encoding process:

- 1. Fixed metadata which are solely dependent on the « Channel Mode » parameter (3/2 with active LFE for programmes using 5.1, 3/2 without active LFE for programmes using 5.0 and 2/0 for stereo programmes)**
- 2. Default metadata that may be modified during encoding on the grounds of a justified request based on the mixing and encoding forms appended hereto.**
- 3. Metadata dependent solely on mixing which may be validated by metering.**

Any alterations to metadata set out in the table below constitute grounds for refusal to broadcast if they are not backed up by means of the “Dolby E mixing and encoding forms” and they remain subject to the Broadcaster’s approval.

NB : The Extended BSI mode must necessarily be used for 5.1 et 5.0 programmes. However, it must not be used for stereo formats.

Paramètres		Programme 5.1	Programme 5.0	Programme Stéréo (2.0)	Programme mono/dual	Signal de référence
	“Dialog level”	- 23 LUFS ± 1 (measure)	- 31 LUFS			
	Program Name	Broadcaster choice**	Broadcaster choice **	Broadcaster choice **	Broadcaster choice **	Test_Check
Audio Processing	Channel Mode	3/2	3/2	2/0	2/0	3/2 ou 2/0
	LFE Channel	Enable	Disable	N/A	N/A	5.1: Enable 5.0: Disable 2.0: N/A
	DC Filter	Enable	Enable	Enable	Enable	Enable
	Low pass Filter	Enable	Enable	Enable	Enable	Enable
	LFE Low pass Filter	Enable	Disable	N/A	N/A	5.1: Enable 5.0: Disable 2.0: N/A
	Srnd Phase Shift*	Enable	Enable	N/A	N/A	3/2: Enable 2.0: N/A
	Srnd 3 dB Attenuation	Disable	Disable	N/A	N/A	3/2: Disable 2.0: N/A
Dynamic Range	Line Mode Pro	Film LIGHT	Film LIGHT	Film LIGHT	Film LIGHT	None
	RF Mode Pro	Film Standard	Film Standard	Film Standard	Film Standard	None
	RF Overmod Protect	Disable	Disable	Disable	Disable	Disable
Bitstream info	Bitstream Mode	Main Complete				
	Center Downmix Level	0.707 (-3 dB)				
	Srnd Downmix Level	0.707 (-3 dB)				
	Dolby Srnd Mode	N/A	N/A	Dolby Surround enabled	Dolby Surround enabled	N/A
	Copyright bit	Yes	Yes	Yes	Yes	Yes
	Original Bitstream	Yes	Yes	Yes	Yes	Yes
	Audio Production Info	Disable	Disable	Disable	Disable	Disable
	Mix Level	N/A	N/A	N/A	N/A	N/A
	Room type	N/A	N/A	N/A	N/A	N/A
Extended BSI	Preferred Stereo Downmix*	Lt/Rt	Lt/Rt	N/A	N/A	3/2: Lt/Rt 2.0: N/AN/A
	Lt/Rt Center Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Lt/Rt Surround Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Lo/Ro Center Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Lo/Ro Surround Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Dolby Surround EX Mode	Not Surround EX	Not Surround EX	N/A	N/A	N/A
	A/D Converter Type	Standard	Standard	Standard	Standard	Standard

* Surround Phase Shift and Preferred Downmix parameters are inter-dependent. Please refer to paragraph A.2.6.4.4 for their parameters.

** The Programme Name entered must not contain any characters with accents or spaces.

Figure 2: Table of Dolby-E metadata default parameters for 5.1, 5.0, 2.0, dual and mono formats

ABCDE	Fixed metadata dependent solely on the « Channel mode » parameter	Métadonnées figées
ABCDE	Default metadata that may be modified if justified (cf. Notes)	Métadonnées par défaut
ABCDE	Metadata dependent on the mixing	Métadonnées dépendantes

A.2.6.4.4 - Method for modifying metadata

It is compulsory to complete a mixing form for each programme as well as an encoding form for each Dolby-E track (cf. appendices); this allows the mixer to pass on the necessary information to justify the use of a value other than the default value.

- Surround 3dB Attenuation :** Configured by default in Disable mode. May be configured in Enable mode only if the mixing was performed in a cinema auditorium calibrated with rear channels attenuated.
- Line Mode :** Configured by default in Film Standard mode. May be configured in Film Light mode if the mixing dynamics are considered to be well-controlled. A musical programme may be configured in Music Standard or in Music Light mode.
- Center Downmix Level :** This parameter cannot be entered manually. This value is automatically entered as an approximation of the value entered for the *Lo/Ro Center Downmix Level*.
- Surround Downmix Level :** This parameter cannot be entered manually. This value is automatically entered as an approximation of the value entered for the *Lo/Ro Surround Downmix Level*.
- Lt/Rt Center Downmix Level :** Configured by default at -3dB, May be modified to optimise the compatibility with stereo reduction.
- Lt/Rt Surround Downmix Level :** Configured by default at -3dB, May be modified to optimise the compatibility with stereo reduction.
- Lo/Ro Center Downmix Level :** Configured by default at -3dB, May be modified to optimise the compatibility with stereo reduction.
- Lo/Ro Surround Downmix Level :** Configured by default at -3dB, May be modified to optimise the compatibility with stereo reduction.
- Dolby Surround EX Mode :** Configured by default in Disable mode. It may be configured in Enable mode only if the original mixing was done in a 6.1 system using Dolby Surround EX matrixing.
- Preferred Stereo Downmix:** Configured by default in Lt/Rt mode. This may be adjusted to Lo/Ro mode only if the 5.1 programme is a musical programme (Cf. §0). **The mode selected for this parameter entails a specific and compulsory manual configuration of the Surround Phase Shift parameter.**
- Surround Phase Shift :** This parameter is dependent on the **Preferred Stereo Downmix** parameter. The following compulsory correspondence is established between these two parameters:

:

Preferred Stereo Downmix	entails Surround Phase Shift
<u>Lt/Rt</u>	<u>Enable</u>
<u>Lo/Ro (Music only)</u>	<u>Disable</u>

A.3 - TIME CODE SPECIFICATIONS

A.3.1 - GENERALITIES

The Time Code is an ATC (Ancillary Time Code) time code which must comply with **SMPTE 291M** specifications.

The tape must necessarily have continuous LTC and VITC time codes, increasing in value, without breaks, from the physical start of the tape to the end of the 30 seconds following the recorded programme, **not using 24 hours (00 :00 :00 :00)**.

LTC and VITC codes (1 and 2) must be identical and synchronous.

VITCs (1 and 2) must comply with SMPTE 12 revised 3 specifications, i.e. transmitted on VANC and positioned on lines 9 and 571.

The first useful image of the programme will begin at LTC and VITC **10:00:00:00**.

Unless the Broadcaster specifically requests this, multi-programmes are not permitted.

A.3.2 - SEQUENCE : NO CROSSOVERS

In the case of a programme requiring two cassettes or more, the time code associated with the useful pictures must be continuous. If N is the time code of the last picture on one tape, the time code of the first picture of the following tape must be N+1 picture. In the case of three tapes or more, the same rules apply.

A.3.3 - USER BITS:

Unless the Broadcaster specifically requests otherwise, User Bits have the value "00.00.00.00" for the duration of the tape, including the technical trailer.

A.4 - ORGANISATION OF THE CONTENT

The following diagram gives a graphic illustration of the organisation expected of the tape in terms of audio, video & timecode. It breaks down as follows:

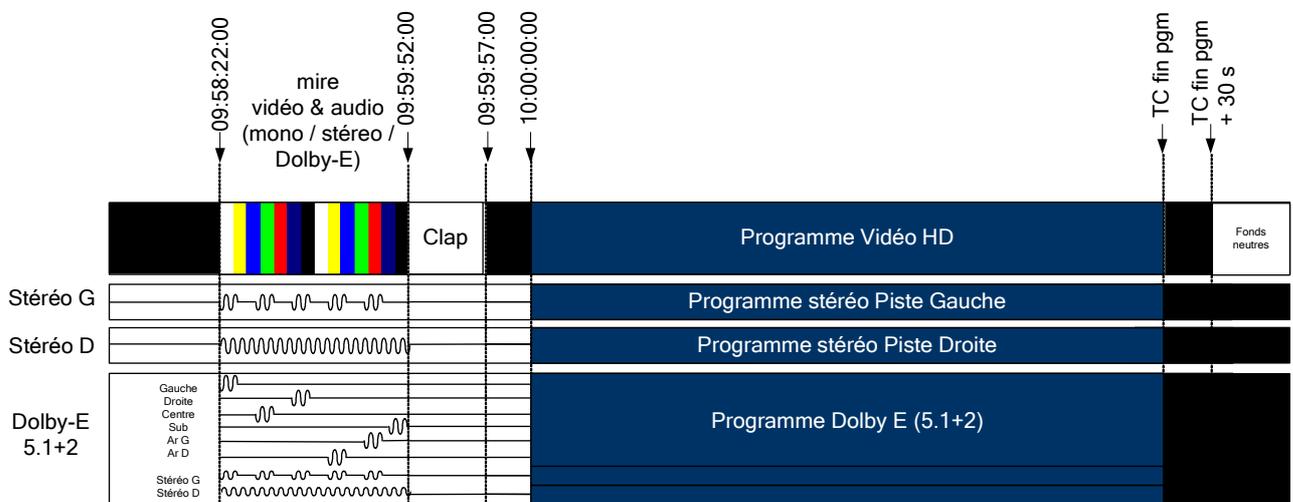


Figure 3 : Organisation of the content

A.4.1 - VIDEO

A.4.1.1 - From 09:58:22:00 (inclusive) to 09:59:51:24 (inclusive)

When the programme is recorded – and using the same video source (same VCR) - a recording of one minute and thirty seconds (1'30") of a bar chart with chroma and luminance set to 100 %: 100/0/100/0.

A.4.1.2 - From 09:59:52:00 (inclusive) to 09:59:56:24 (inclusive)

Clap : five seconds coded black (5") with text identification elements:

- Programme title and sub-title, episode or part number
- Tape number (1/2, 2/2, ...)
- Duration of the programme (HH : MM : SS : II)
- Identification number appertaining to the Broadcaster, EM n°
- Tape format, HD or SD
- Description of audio track formats with assignment of audio and language tracks for each track.
- Original shooting format (1,33 ; 1,66 ; 1,77 ; 1,85, 2,35, or other – please specify)
- Re-framing format further to the Broadcaster's specific request
- Broadcast format (16/9)
- HD Format: 1080/50i
- Presence of sub-titles + language
- Presence of neutral backgrounds

A.4.1.3 - From 09 :59 :57 :00 (inclusive) to 09 :59 :59 :24 (inclusive)

Black lasting three seconds (3"), coded and silent.

A.4.1.4 - From 10 :00 :00 :00 (inclusive) to TC at end of programme

Start of usable programme.

A.4.1.5 - From end of programme TC to end of programme TC + 30 seconds

Thirty seconds (30") of black, coded and silent.

A.4.1.6 - From end of usable programme TC + 30 seconds

Neutral background (video elements allowing the manufacture of French credits) back to back

N.B. : Particular attention should be paid to the following elements:

- End of programme credits must remain strictly legible on video.
- The duration of advertising blacks in foreign programmes must not exceed one second (≤ 1 second)

A4.2 - AUDIO

A.4.2.1 - From 09 :58 :22 :00 (inclusive) to 09 :59 :51 :24 (inclusive)

Monophonic tracks : Odd and even tracks, continuous frequency of 1000 Hz at line-up level. The tone of both tracks must be coherent (same source) and in time.

Stereophonic and multi-channel versions : Multi-channel and stereo identification and line-up audio signals must comply with recommendation EBU Tech 3304 « Multichannel Audio line-up Tone », May 2009.

Multi-channel versions : Multi-channel and stereo identification and line-up audio signals must comply with paragraph 4.2 "EBU multi-channel ident signal) from recommendation EBU Tech 3304 'Multi-channel Audio line-up tone", May 2009. This clause implies the use of the "blits" sequence available on the EBU website.

The commonly used coding system metadata (Dolby E) throughout the test signals must be adjusted to the following settings:

- *Dialog Level = -31*
- *Line Mode = None*
- *RF Mode = None*
- *Surround 3dB attenuation = disable*

A.4.2.2 - From 09:59:52:00 (inclusive) to 09:59:59:24 (inclusive)

- *PCM Format: Silence lasting 8 seconds (8").*
- *Dolby E Format: Silence lasting 8 seconds (8") Dolby E encoded **with the metadata of the useful programme.***

A.4.2.3 - From 10 :00 :00 :00 (inclusive)

Start of useful programme

A.4.2.4 – From end of programme TC

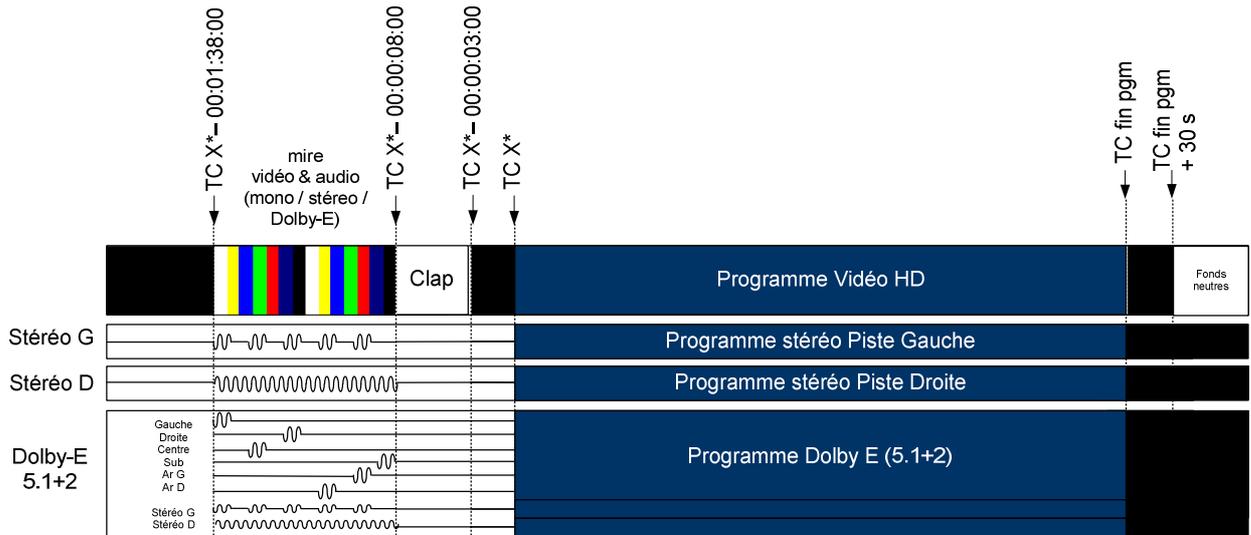
From end of useful programme Time Code and for a duration of thirty seconds (30"): silent, coded black.

A.4.3 – SPECIAL CASE OF MULTI TAPES

In case of programmes delivered on several tapes, the organisation of the content of the additional tapes is similar to the organisation of the first tape, with the exception of the time code.

As specified in § A.3.2, for a Time Code of X-1 corresponding to the Time Code of the last useful image of the preceding tape, the Time Code on the first useful image of the additional tape is X.

The Time Codes on the various components of additional tapes therefore correspond to the diagram on the following page :



***X = Time Code de la première image utile**

Figure 4: Content organisation for additional tapes

A.5 - SUBTITLES

Since there is no standardisation currently available with regard to the management of HD sub-titling, Broadcasters are entrusted with specifying the delivery method for “sub-titles” data, original soundtrack and Impaired hearing versions.

A.6 - VERIFICATION

Prior to delivery to the Broadcaster, tapes are verified in the following broadcasting standards:

For images:

- The verification of HD programmes is carried out in HD-SDI
- The verification of SD programmes is carried out in SD-SDI

For sound:

- Tracks should be listened to in stereo and multi-channel (Dolby Surround, Dolby-E).
- It is compulsory to validate the compatibility of the Downmix 5.1 to Stereo or to Mono - in multi-channel programmes – in Film Standard RF mode, with at least one random verification for long programmes and in full for short programmes.
- The values of Dolby metadata should be verified.

IMPORTANT INFORMATION: for HD-DTT broadcasts, it is the multi-channel component – when available – that is broadcast as the main audio component. For viewers who are not equipped with a 5.1 installation, it is this component that will be “downmixed” by the HD-DTT receiver.

GLOSSARY OF ACRONYMS

CST : Commission Supérieure Technique de l'Image et du Son: Association of Technicians from the fields of sound and image in cinema and television.

FICAM : Federation des Industries du Cinéma, de l'Audiovisuel et du Multimédia

HDFORUM : Association comprising three sections of broadcasters, manufacturers and distributors, comprising 64 members as at today, whose aim is to promote the improvement of the quality of the television service in France.

ITU : International Telecommunication Union, in charge of recommendations and international planning of telecommunications (IUT in French)

EBU : European Broadcast Union: union of radio-broadcasters (broadcasters, television channels) (UER in French)

SMPTE : Society of Motion Picture and Television Engineers: American association of cinema and television technicians

IEC : International Electrotechnical Commission

AES : Audio Engineering Society

FHA : Full Height Anamorphic: corresponding to an anamorphosed 16/9 format (compressed sideways) for screening on a 4/3 screen

SAV : Start Active Video

EAV : End Active Video

LUFS : Loudness Unit in relation to a Full Scale: this is the expression of a weighted measurement, K (or R2LB) on a Full Scale.

K or R2LB : This is a weighting curve derived from the weighting, B, integrating the modifications to this weighting in the perceptive treatment of low frequencies.

PCM : Pulse Code Modulation: referenced as the digital representation of an analogue signal without any flow reduction or compression algorithm.

PPM : Peak Programme Meter

CRC : Cyclic Redundance Code

LTC : Linear Time Code (biphase)

VITC : Vertical Internal Time Code: time code integrated into the video signal

VANC : Vertical Ancillary Data Space: digital information not integrated into the digital image

APPENDIX 1

Mixing Information Sheet

Appendix 2

Encoding Information Sheet

Fiche d'information de mixage

Date : / /

Programme musical

Projet :

ID Projet :

Version¹ :

Langue :

Client :

Production :

Studio :

Ingénieur :

Echantillonnage : 32 kHz 44.1 48 kHz 88 kHz 96 kHz 192 kHz
 Résolution : 16 bits 20 bits 24 bits 32 bits
 TC (ips) : 24 25 Harmonisation (Pitch shift) 24/25 ips préconisée

Destination du Mix : TV DVD Cinéma
 Type de mix : Mono Stéréo LtRt Stéréo LoRo
 5.1 5.0 6.1
 4.0 3/0 (LCR) 3/1 (LCRS)

Metadatas :

Méthode de mesure du Dialnorm		<input type="checkbox"/> Dialog Level 2	<input type="checkbox"/> Loudness ³	<input type="checkbox"/> Pas de dialogues
<input type="checkbox"/> Mesure Leq(A) (autorisée jusqu'au 30/06/2008)				<input type="checkbox"/> Programme court
Dialogues mesurés :	TC in :	TC Out :	Intitulé séquence :	
1.	<input type="text"/>	<input type="text"/>	<input type="text"/>	
2.	<input type="text"/>	<input type="text"/>	<input type="text"/>	
3.	<input type="text"/>	<input type="text"/>	<input type="text"/>	
4.	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Dialnorm : Niveau d'écoute : dB(C) SPL

<input type="radio"/> Standard	<input type="radio"/> Non Standard	
	PGM Multicanal seulement (Plus de 2 pistes)	<input type="checkbox"/> Dolby Surround EX <input type="checkbox"/> Line Mode : Film/Music Light <input type="checkbox"/> Surround 3dB Attenuation
		Si Musique <input type="checkbox"/> LtRt Avec Surround Phase Shift <input type="checkbox"/> LoRo Sans Surround Phase Shift
PGM Stéréo ou Mono	<input type="checkbox"/> Dolby Surround Mode <input type="checkbox"/> Line Mode : Film/Music Light	

Center Downmix Level :

LoRo : dB

LtRt : dB

Surround Downmix Level :

LoRo : dB

LtRt : dB

Commentaires :

¹ Version de mix (ex : Stéréo LtRt ou Multicanal)

² Valeur moyenne mesurée sur l'ensemble des passages contenant des dialogues. Courbe RLB, mesure sur tous les canaux

³ Valeur moyenne mesurée sur toute la durée du programme utile. Courbe RLB, mesure sur tous les canaux

