

Technical and Delivery Requirements For TG4

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Introduction

This document defines the technical standards for programmes that have been commissioned by TG4, either on tape or directly from studio or OB contributions. It sets out the technical requirements for delivery to ensure that delivered material is of a satisfactory standard.

The requirements for technical standards, quality and delivery must be adhered to as specified in the following sections. More specific information will appear in this document giving further details or additional information that may further enhance the key requirements.

1 General Technical Requirements

1.1 Contacts

TG4 Reception - 091 505050

Technical Manager

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Chief Engineer

John Higgins – 091 505230 e-mail: john.higgins@tg4.ie

1.2 Video Standard

All signals and recordings supplied shall be of the 625/50 interlaced standard unless agreed otherwise. The majority of material should be sourced digitally where possible and must meet CCIR Rec. 601 or ITUR BT601-5 Part A.

1.3 Line-Up

Programme video and audio signal levels must be accurately related to their associated line-up signals. The maximum deviation of programme levels from that indicated by the line-up signals shall be:

- Video Luminance 3%
- Video Chrominance 5%

1.4 Video Signal Timings

Digitally delivered pictures are considered to have a nominal active width of 702 pixels (52usec) centred on the digital active line width of 720 pixels. Additional pixels at start/end of line should be an extension of the main picture or black. The relative timing of luminance and chrominance shall not exceed ± 20 ns.

1.5 Video Levels & Gamut (illegal Colours).

Colour gamut must comply with EBU Recommendation R103-2000.

- Luminance limits -1% and 103%
- Chrominance 105% max
- RGB values should not exceed limits -5% to +105%

1.6 Timecode

All tapes must be supplied with continuous, increasing, timecode on both the longitudinal track (LTC) and on lines 19, 21 and 332, 334 in the vertical interval (VITC). Timecode must be contiguous, coherent and not pass through zero at any point from the start of the first countdown clock to beyond the end of the programme. LTC and VITC must be identical. Timecode must have the correct phase relationship with the corresponding video track.

1.7 Aspect Ratio.

Programmes will be commissioned only in 16:9 aspect ratio. Commercials must be shot and supplied in widescreen 16 x 9 (full height) anamorphic.

See [section 4.1](#) for delivery requirements

1.8 Safe Areas for Action and Captions

Any programmes commissioned for 16:9 aspect ratio shall be protected for 14 x 9 action and 4 x 3 caption and title safe, unless otherwise agreed. It is not acceptable for changes from 16:9 display to 4:3 display within a programme.

Commissioning will advise on specific programme requirements regarding format presentation and safe areas.

See [appendix 3](#) for further details.

2 Audio Requirements

2.1 Audio Standards

Programmes shall be delivered in Mono or Stereo Format as required. Mono shall be in Dual Mono format with identical audio on both Left and Right channels.

- Left leg must be present on A leg or channel 1
- Right leg must be present on B leg or channel 2

2.2 Audio Reference Level

Peak programme level shall be measured with a Peak Programme Metre (PPM) and shall never exceed more than +8dBs above the programme's reference level. Line up level is represented on a PPM as PPM 4 (0dbu level).

Reference Level represents a level that is 8dB less than the maximum allowed during the programme. Audio levels must not peak beyond PPM 6.

When mono is derived from Stereo, the Mono signal is derived as follows:

Mono = (L+R) - 6dB.

- Digital Audio Reference level is defined as 18dB below the maximum coding value (-18dbfs)

2.3 Sound to Vision Synchronisation

There should be no discernible lip-sync errors between sound and vision. The relative timing of sound to vision should be less than 20 milliseconds lead or lag.

2.4 Stereo Balance and Phase

The two stereo legs, when sending identical programme (Mono), shall match within 0.5dB and be phase coherent to less than 15 degrees at 10kHz.

2.5 Picture formats

TG4 broadcasts analogue terrestrial, digitally on cable and MMDS and since April 2003 we are also available on the Sky digital platform. TG4 have switched to widescreen transmission since September 2006. All new programmes being shot must be in a widescreen picture aspect ratio of 16:9.

To accommodate the majority of viewers on the existing analogue channel using picture displays with an aspect ratio of 4:3, most new commissions in widescreen will be required to 'shoot to protect' the central 14:9 zone within the overall 16:9 picture frame. Captions and titles are required to be 4 x 3 safe. There may be some productions that require protection of the 4:3 central zone or full 16:9 image only.

See [appendix 3](#) for more details

2.6 Line 23 Signaling

The first half of line 23 should be black. There should be no active format descriptor (AFD) information or other signaling on Line 23 of the delivered tape.

3. General Quality Requirements

3.1 Technical Quality Grading

Overall quality of sound and vision will be separately assessed and any impairments noted. At the end of the technical review the programme will be judged for sound and vision quality against the ITU-R 5-point quality grading scale.

Grade 5	Excellent
Grade 4	Good
Grade 3	Fair
Grade 2	Poor
Grade 1	Bad

Live programmes should achieve grade 5 standard, while commissioned programmes should meet a minimum of grade 4 for sound and vision quality. The minimum acceptable quality for any programme is grade 3 unless there are valid reasons for technical exemption, in which case details should be clearly stated on the recording report.

3.2 General Vision Quality Requirements

- The video signal must be free of excessive black crushing and highlight compression.
- Skin tones should be natural with realistic colour rendition, unless artistic considerations dictate otherwise.
- Ensure that details in darker parts of the picture are visible
- Non-linear editing systems should ensure that excessive noise is reduced by means of suitable noise reduction equipment.
- Compression rates of 5:1 or less should be used for non-linear editing systems.
- DV and DVCam camcorders are generally not suitable for 16:9 Widescreen production.
- DV Palmcorders may be considered when shooting actuality material or where a high level of mobility is required.

The use of material from all other non-broadcast and domestic videotape formats is not permissible except where agreed in advance with the head of commissioning.

Note: See [appendix 2](#) for details on "Photo Sensitive Epilepsy".

3.3 General Audio Quality Requirements

- Audio levels throughout the recording shall not exceed +8 dB over the line-up source tones (PPM 6).
- There should be no discernible lip-sync errors.
- Audio compression should be used as little as possible as it can intensify impairments. (Material, which is highly compressed, should not exceed PPM 4).
- Sibilance and distortion, wow and flutter shall not be apparent.
- The audio shall be free of noise, hum and cross-talk.
- Many viewers still listen in mono. You must check that your programme sound will be compatible with monophonic reception, particularly that the dialogue is fully comprehensible.
- Particular care should be taken to ensure sufficient separation between dialogue and M&E (music and effects). Many listeners have hearing deficiencies that make dialogue difficult to follow if the level of M&E is too high.

3.4 DVCAM, DV or Mini-DV formats

In certain circumstances the use of a DV based recording format may be considered acceptable (See [appendix 1](#) for technical exemptions). Specific agreement must be sought first from the commissioning department before using this format. If the use of this format has been agreed then particular attention should be given to sound and lighting in order to achieve acceptable results.

Note: DV based recording formats have only half the colour resolution of Digital Betacam and when switched to 16:9 widescreen, many will reduce the vertical resolution by 25% (letterboxed image).

DV formats are generally not considered suitable for widescreen acquisition unless they use true type 16:9 CCD elements.

DVCAM can deliver better results depending on camera features such as the type of CCD chips and the lens used.

4 Programme Delivery Requirements - Tape

4.1 Tape Formats

All material must be supplied in Digital Betacam tape format, and shall replay to the ITU Rec656 standard.

The tape must contain Video, Audio, Timecode and be accompanied by documentation details. All material must now be shot in 16:9 format and delivered as outlined below.

1 x Digital master 16:9 (full height anamorphic) with burnt-in logo.

1 x Digital transmission copy 16:9 (full height anamorphic).

4.2 TG4 Logo

The transmission copy must be delivered to TG4 with a specified burnt-in TG4 logo within the first 10 seconds of the start of programme. The logo should appear four seconds from the start of programme with a fade up/down of sixteen frames.

4.3 Clean Title Backgrounds

Also known as textless or neutral backgrounds, they allow broadcasters to translate titles into their own language.

4.4 Recording Reports

Every tape submitted must contain a recording report with full details of the programme supplier, recording facilities house, programme title and TG4 programme number. Details of origination format, timecode of First Frame Of Picture (FFOP), aspect ratio and safe area used should also be included.

The recording report must provide clear reference to any part of the programme that may attract poor grades (especially below 3).

4.5 Audio Track Allocation

Audio track allocation must conform to the following standards unless otherwise stated in the programme contract.

Track 1	Track 2	Track 3	Track 4
Programme		Music & Effects (M&E)	
left (A)	right (B)	Left	Right
Final mix on tracks 1 and 2 must be phase coherent		These tracks must only have M&E	

For Monophonic programmes, tracks 1 and 2 must contain identical audio and be phase coherent so that they can be transmitted through a stereo infrastructure - "Dual Mono".

4.6 Timecode

Both longitudinal timecode (LTC) and vertical interval time-code (VITC on VBI lines pairs 19 and 21, and 332 and 334) must be recorded throughout the line-up and programme and comply with EBU specification N12-1994.

LTC and VITC must have identical times. Time-code and control track must have the correct phase relationship with the corresponding video track.

5 Operational Requirements for Tape Delivery

5.1 Line-up Test Signals and Leader

A countdown clock indicating programme title, subtitle and episode number should proceed the start of the programme and any subsequent part. It must provide a clear countdown of at least 20 seconds fading to black at 3 seconds prior to first programme pictures.

The Line-up sequence should be as follows:

Timecode	Picture	Audio 1	Audio 2
(e.g.)			
09.58.00.00	100% Colour Bars or EBU	Interrupted	Continuous
		Tone	Tone
09.59.30.00	Ident & Clock	--- optional step-tone ---	
09.59.40.00	Ident & Clock	Silence	Silence
09.59.57.00	Black	Silence	Silence
10.00.00.00	Programme	Programme	Programme
		Audio left	Audio right

5.2 Line-up levels

Audio line-up shall be 1kHz tone recorded at the reference level (0dBu). Interrupted tone identifying the left channel of a stereo recording should be broken for 0.25 sec every 3 seconds.

The reference level of AES recordings must correspond to -18dB with respect to maximum coding level. This means that the audio reference level 0dbu (PPM4) corresponds to -18dbFS. (AES pre-emphasis should not be used).

5.3 Subtitles

Production companies should send a VHS copy or other agreed tape format of the **edited master tape** to the Subtitle Company nominated in your contract (Subtitle production company requirements may vary). The tape should be supplied with the following:

- Burnt-in timecode (BITC on top of screen)
- Programme audio on audio track 1
- Longitudinal timecode (LTC) on audio track 2
- A copy of the script

Contracted subtitle companies should deliver the completed subtitle file by email to the following e-mail address: fotheidil@tg4.ie or alternatively send them on a 3.5" floppy disk to TG4 Scheduling.

5.4 Compilation tapes

Programmes of short duration may be delivered on compilation tapes where this has been agreed in advance and specified in the contract. The following requirements must be observed:

- The tape box and record report must clearly identify the separate programmes on the tape.
- Each programme must be preceded by a leader clock clearly identifying individual programme details
- Standard timecode practices must be observed over the recorded length of the tape.

6. Programme Delivery Requirements - Live

This section covers outside broadcasts (OB's) and remote feeds from regional studios.

6.1 Technical Line-up Requirements

The remote facility must be able to provide vision and audio line-up signals of 75% colour bars and GLITS tone identifying left and right channels. Additional audio channels (3 & 4) can be identified using a line-up frequency other than 1KHz. Programme signal levels should relate to line up signal levels.

Pre-recorded inserts must be in the same aspect ratio as live material and both graphic images and inserts must always comply with the video standards set out in this document.

Line-up signals must be available at least 30 minutes prior to the programme start time, and a technically competent contact must be designated to liaise with TG4 engineering staff.

Moving pictures will be required, as part of the line-up procedure to check for synchronous audio and to ensure the incoming line-up is not a frozen image.

The video and audio signals must be continuous and stable in all respects throughout the broadcast period. Remote sources to the facility must be fed in such a way to ensure stable synchronous signals are present on the transmission output at all times.

6.2 Communications

Contact numbers should be made available well in advance. A contact for the source engineer needs to be available for the TG4 Duty Engineer.

Dial-in audio codecs may be used for commentary feeds for some OB contributions (codec setting details are available on request).

To establish talkback with TG4, phone the **Input room** and you will then be transferred on to the talkback system.

6.3 Bookings

The production company producing the material shall be responsible for the costs of all necessary communications and for ensuring that all the necessary circuits are booked from the source to the point of recording or transmission.

Satellite booking details should be e-mailed to: sat@tg4.ie It should also include talkback requirements and contact numbers.

6.4 Resilience

A backup path is usually available during live programme events. TG4 will normally have a satellite down link or RTE contribution feed booked to act as standby in the event of a break-in transmission.

TG4 have permanent circuits to RTE and to their regional studios.

Appendix 1

7 Technical Exemptions

All programmes are expected to meet the required technical standards. Any proposal to deliver programme material, which does not conform to the technical standards in these guidelines must be agreed beforehand with Commissioning. Where programmes fail to meet full broadcast technical specifications and fall outside these categories it will be necessary to apply for special exemption.

7.1 Categories for technical exemption.

Artistic interest: Innovative or experimental productions, which are made, of necessity, by those who do not have access to equipment or facilities meeting broadcast quality standards.

Historic interest: News or programmes of a documentary nature which show historic events taking place or whose subject matter requires the use of archive material.

Actuality material: News, features or documentaries of an actuality nature where better quality has not been possible because of limitations placed on the format or physical size of equipment used. Such limitations are those incurred as a result of shooting in difficult areas such as war zones, isolated locations, confined spaces or other difficult environments.

Early television and cinema: Excerpts from historical archives where low technical quality was due to the then current performance of equipment used in its creation or where quality is now lower than at the time of original showing because of film or video ageing.

Domestic equipment: Programmes, which employ excerpts made using domestic equipment in which the context requires that it is used.

Appendix 2

8 Flashing Images and repetitive visual patterns

Flickering or intermittent lights and certain types of repetitive visual patterns can cause problems for some viewers who have photosensitive epilepsy (PSE).

The guidelines can be summarised as follows:

- Every bright flash should be followed by at least 8 frames if dark. Changes in colour, though, are not a problem, unless there are large fluctuations in the amount of red in the image.
- Rapidly flickering images should not flicker more than 3 per second. Prominent and regular patterns, which cover a large portion of the picture should be avoided, especially if they are moving or flickering.
- Care needs to be taken with computer-generated images, especially if highly detailed, because a high degree of inter-line flicker can result. (This is at 25Hz, and so is not acceptable).

The exceptions are:

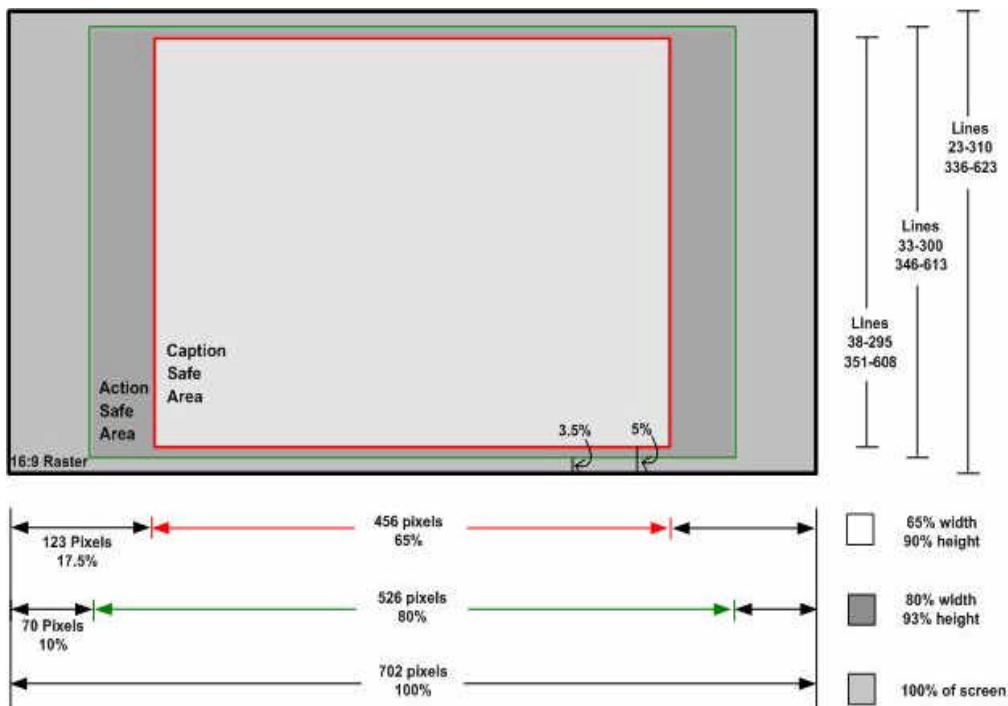
- If the luminance change between the light and dark frames is less than 10%.
- If the flickering/flash part of the image occupies less than 10% of the screen area - unless the culprit is highly saturated red, in which case it constitutes a PSE infringement even if it occupies less than 10% of the screen area.

For additional information please contact TG4.

Appendix 3

9 WideScreen shoot to protect 14:9

	Vertical	Horizontal		
		16:9 image	14:9 zone	4:3 zone
Action safe margin (14:9)	3.5%	10%		
Graphics safe margin (4:3)	5%	17.5%		



This recommendation is used for all programmes commissioned in widescreen.

A 14:9 letterbox presentation provides a good compromise for many programme genres when a 16:9 widescreen production is viewed on a 4:3 display. The widescreen pictures must be framed to protect the central 14:9 area.

The Action safe area is within the 14:9 zone. However, for the time-being, the Graphics safe area should be constrained within the 4:3 central zone to ensure that graphics and captions are adequately protected when viewed under the least favourable conditions.

See EBU recommendation R95-2000 for further details.

Appendix 4**10 Revision History**

Version	Date	Name	Description
2.4	13.5.2004	J Higgins	First Draft (Major revision)
2.5	20 7.2005	J Higgins	Minor revision – changes to subtitle delivery requirements with some additional references added.
2.6	16.12.2005	J Higgins	Widescreen format requirements added for changeover in Sept. 2006
2.7	17.1.2008	J Higgins	Removed references to any pre widescreen delivery requirements.
2.8	18.1.2008	J Higgins	Added revision history section and updated appendix 3.