

International Telecommunication Union

**ITU-R**  
Radiocommunication Sector of ITU

**Report ITU-R BS.2217-2**  
(10/2016)

**Compliance material for  
Recommendation ITU-R BS.1770**

**BS Series**  
**Broadcasting service (sound)**



International  
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## Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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### Series of ITU-R Reports

(Also available online at <http://www.itu.int/publ/R-REP/en>)

Series	Title
<b>BO</b>	Satellite delivery
<b>BR</b>	Recording for production, archival and play-out; film for television
<b>BS</b>	<b>Broadcasting service (sound)</b>
<b>BT</b>	Broadcasting service (television)
<b>F</b>	Fixed service
<b>M</b>	Mobile, radiodetermination, amateur and related satellite services
<b>P</b>	Radiowave propagation
<b>RA</b>	Radio astronomy
<b>RS</b>	Remote sensing systems
<b>S</b>	Fixed-satellite service
<b>SA</b>	Space applications and meteorology
<b>SF</b>	Frequency sharing and coordination between fixed-satellite and fixed service systems
<b>SM</b>	Spectrum management

*Note: This ITU-R Report was approved in English by the Study Group under the procedure detailed in Resolution ITU-R 1.*

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## REPORT ITU-R BS.2217-2

**Compliance material for Recommendation ITU-R BS.1770**

(Question ITU-R 2/6)

(2011-2012-2016)

**Summary**

This Report contains a table of compliance test files and related information for verifying that a meter meets the specifications within Recommendation ITU-R BS.1770.

Compliant meters will give the results indicated in the Table below to a tolerance of  $\pm 0.1$  LKFS. The term *file-based measurement* indicates a meter that measures the test file exactly from the beginning of the file. The term *live* indicates a meter that does not necessarily begin at time zero, and thus different time-alignment of blocks used in processing relative to the programme content, could occur in the measure leading to a slightly different result, as indicated. All the files are 16-bit PCM wav-files at a sampling rate of 48 kHz.

## CONTENTS

## 1 Compliance material for Recommendation ITU-R BS.1770

File <sup>(1)</sup>	File-based measurement	“Live” measurement	Description	No. of channels
<u>1770Comp-2_RelGateTest.wav</u>	-10.0 LKFS	-10.0 to -10.2 LKFS	Relative gate test (Note this item will give a measurement value of approximately -8.0 LKFS if a -8 LU relative gate is used.) 1 kHz tone at levels of ~-90, -20 and -7 dBFS	2 (L/R)
<u>1770Comp-2_AbsGateTest.wav</u>	-69.5 LKFS	-69.4 to -69.8 LKFS	Test for -70 LKFS absolute gate. If no absolute gate is implemented the measurement result will be -73 LKFS 1 kHz tone at levels of ~-90 dBFS and -69 dBFS	2 (L/R)
<u>1770Comp-2_24LKFS_25Hz_2ch.wav</u>	-24.0 LKFS	-24.0 LKFS	25 Hz sine wave @ ~-13 dBFS	2 (L/R)
<u>1770Comp-2_24LKFS_100Hz_2ch.wav</u>	-24.0 LKFS	-24.0 LKFS	100 Hz sine wave @ ~-22 dBFS	2 (L/R)
<u>1770Comp-2_24LKFS_500Hz_2ch.wav</u>	-24.0 LKFS	-24.0 LKFS	500 Hz sine wave @ ~-23 dBFS	2 (L/R)
<u>1770Comp-2_24LKFS_1000Hz_2ch.wav</u>	-24.0 LKFS	-24.0 LKFS	1 kHz sine wave @ ~-24 dBFS	2 (L/R)
<u>1770Comp-2_24LKFS_2000Hz_2ch.wav</u>	-24.0 LKFS	-24.0 LKFS	2 kHz sine wave @ ~-26 dBFS	2 (L/R)
<u>1770Comp-2_24LKFS_10000Hz_2ch.wav</u>	-24.0 LKFS	-24.0 LKFS	10 kHz sine wave @ ~-27 dBFS	2 (L/R)
<u>1770Comp-2_23LKFS_25Hz_2ch.wav</u>	-23.0 LKFS	-23.0 LKFS	25 Hz sine wave @ ~-12 dBFS	2 (L/R)
<u>1770Comp-2_23LKFS_100Hz_2ch.wav</u>	-23.0 LKFS	-23.0 LKFS	100 Hz sine wave @ ~-21 dBFS	2 (L/R)
<u>1770Comp-2_23LKFS_500Hz_2ch.wav</u>	-23.0 LKFS	-23.0 LKFS	500 Hz sine wave @ ~-22 dBFS	2 (L/R)
<u>1770Comp-2_23LKFS_1000Hz_2ch.wav</u>	-23.0 LKFS	-23.0 LKFS	1 kHz sine wave @ ~-23 dBFS	2 (L/R)
<u>1770Comp-2_23LKFS_2000Hz_2ch.wav</u>	-23.0 LKFS	-23.0 LKFS	2 kHz sine wave @ ~-25 dBFS	2 (L/R)
<u>1770Comp-2_23LKFS_10000Hz_2ch.wav</u>	-23.0 LKFS	-23.0 LKFS	10 kHz sine wave @ ~-26 dBFS	2 (L/R)

File <sup>(1)</sup>	File-based measurement	“Live” measurement	Description	No. of channels
<u>1770Comp-2_18LKFS_FrequencySweep.wav</u>	-18.0 LKFS	-18.0 LKFS	Loudness level is constant, at -18 LKFS, throughout the file. A gain error in the K weighting filter of 1 dB in a 1/3 <sup>rd</sup> octave band will give approximately 0.5 LU deflection using a 3s integration time live meter	1 (L, R or C)
<u>1770Comp-2_24LKFS_SummingTest.wav</u>	-24.0 LKFS	-24.0 LKFS	Test channel gains and summing <sup>1</sup>	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LKFS_SummingTest.wav</u>	-23.0 LKFS	-23.0 LKFS	Test channel gains and summing <sup>1</sup>	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_24LKFS_ChannelCheckLeft.wav</u>	-24.0 LKFS	-24.0 LKFS	Left channel gain check. 1 kHz sine wave @ ~-21 dBFS in left channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_24LKFS_ChannelCheckRight.wav</u>	-24.0 LKFS	-24.0 LKFS	Right channel gain check. 1 kHz sine wave @ ~-21 dBFS in right channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_24LKFS_ChannelCheckCentre.wav</u>	-24.0 LKFS	-24.0 LKFS	Centre channel gain check. 1 kHz sine wave @ ~-21 dBFS in centre channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_24LKFS_ChannelCheckLFE.wav</u>	-inf LKFS	-inf LKFS	LFE channel check. 100 Hz @ ~-19 dBFS. Since the LFE channel is not included in a Rec. BS.1770 measurement, a compliant meter shall indicate the lowest resolvable value, or -infinity.	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_24LKFS_ChannelCheckLs.wav</u>	-24.0 LKFS	-24.0 LKFS	Left surround channel gain check. 1 kHz sine wave @ ~-22.5 dBFS in Ls channel	6 channels (L/R/C/LFE/Ls/Rs)

<sup>1</sup> The LFE should not be included in a meter according to Recommendation ITU-R BS.1770-2. The actual reading will depend on the way in which the LFE channel has been incorporated into the measurement.

File <sup>(1)</sup>	File-based measurement	“Live” measurement	Description	No. of channels
<u>1770Comp-2_24LKFS_ChannelCheckRs.wav</u>	-24.0 LKFS	-24.0 LKFS	Right surround channel gain check. 1 kHz sine wave @ ~-22.5 dBFS in Rs channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LKFS_ChannelCheckLeft.wav</u>	-23.0 LKFS	-23.0 LKFS	Left channel gain check. 1 kHz sine wave @ ~-20 dBFS in left channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LKFS_ChannelCheckRight.wav</u>	-23.0 LKFS	-23.0 LKFS	Right channel gain check. 1 kHz sine wave @ ~-20 dBFS in right channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LFKS_ChannelCheckCentre.wav</u>	-23.0 LKFS	-23.0 LKFS	Centre channel gain check. 1 kHz sine wave @ ~-20 dBFS in centre channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LKFS_ChannelCheckLFE.wav</u>	-inf LKFS	-inf LKFS	LFE channel check. 100 Hz @ ~-18 dBFS. Since the LFE channel is not included in a Rec. BS.1770 measurement, a compliant meter shall indicate the lowest resolvable value, or -infinity.	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LKFS_ChannelCheckLs.wav</u>	-23.0 LKFS	-23.0 LKFS	Left surround channel gain check. 1 kHz sine wave @ ~-21.5 dBFS in Ls channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770Comp-2_23LKFS_ChannelCheckRs.wav</u>	-23.0 LKFS	-23.0 LKFS	Right surround channel gain check. 1 kHz sine wave @ ~-21.5 dBFS in Rs channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf 6ch VinCntr-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Music with speech only in centre channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf 6ch VinL+R-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Music with speech in left and right channels	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf 6ch VinL-R-C-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Music with speech in centre, left and right channels	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf Stereo VinL+R-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Music and speech in both channels	2 (L/R)

File <sup>(1)</sup>	File-based measurement	“Live” measurement	Description	No. of channels
<u>1770-2 Conf Mono Voice+Music-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Music and speech	1
<u>1770-2 Conf 6ch VinCntr-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Music with speech only in centre channel	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf 6ch VinL+R-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Music with speech in left and right channels	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf 6ch VinL-R-C-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Music with speech in centre, left and right channels	6 channels (L/R/C/LFE/Ls/Rs)
<u>1770-2 Conf Stereo VinL+R-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Music and speech in both channels	2 (L/R)
<u>1770-2 Conf Mono Voice+Music-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Music and speech	1
<u>1770Conf-8channels-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Channel gain check for 8 channels. 1 kHz sine wave @ -24 LKFS in total 8 channels.	8 channels (0+7+0) (L/R/C/LFE/Lss/Rss/Lrs/Rrs)
<u>1770Conf-8channels-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Channel gain check for 8 channels. 1 kHz sine wave @ -23 LKFS in total 8 channels.	8 channels (0+7+0)
<u>1770Conf-10channels-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Channel gain check for 10 channels. 1 kHz sine wave @ -24 LKFS in total 10 channels.	10 channels (4+5+0) (L/R/C/LFE/Ls/Rs/Tfl/Tfr/Tbl/Tbr)
<u>1770Conf-10channels-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Channel gain check for 10 channels. 1 kHz sine wave @ -23 LKFS in total 10 channels.	10 channels (4+5+0)
<u>1770Conf-12channels-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Channel gain check for 12 channels. 1 kHz sine wave @ -24 LKFS in total 12 channels.	12 channels (4+7+0) (L/R/C/LFE/Lss/Rss/Lrs/Rrs/Tfl/Tfr/Tbl/Tbr)
<u>1770Conf-12channels-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Channel gain check for 12 channels. 1 kHz sine wave @ -23 LKFS in total 12 channels.	12 channels (4+7+0)

File <sup>(1)</sup>	File-based measurement	“Live” measurement	Description	No. of channels
<u>1770Conf-24channels-24LKFS.wav</u>	-24.0 LKFS	-24.0 LKFS	Channel gain check for 24 channels. 1 kHz sine wave @ -24 LKFS in total 24 channels.	24 channels (9+10+3) (FL/FR/FC/LFE1/BL/BR/FLc/FRc/BC/LFE2/SiL/SiR/TpFL/TpFR/TpFC/TpC/TpBL/TpBR/TpSiL/TpSiR/TpBC/BtFC/BtFL/BtFR)
<u>1770Conf-24channels-23LKFS.wav</u>	-23.0 LKFS	-23.0 LKFS	Channel gain check for 24 channels. 1 kHz sine wave @ -23 LKFS in total 24 channels.	24 channels (9+10+3)

<sup>(1)</sup> All the files are available in the following link: <https://www.itu.int/oth/R1102000001/en>

### Channel ordering and channel weighting of compliance material

No. of Channels		Channel ordering and channel weighting					
1 channel (0+1+0)	Channel ID, Label	1 (Mono)	/				
	Weighting	1.00 (±0.0 dB)					
2 channels (0+2+0)	Channel ID, Label	1 L	2 R	/			
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)				
6 channels (0+5+0)	Channel ID, Label	1 L	2 R	3 C	4 LFE	5 Ls	6 Rs
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	N/A*	1.41 (+1.5 dB)	1.41 (+1.5 dB)
8 channels (0+7+0)	Channel ID, Label	1 L	2 R	3 C	4 LFE	5 Lss	6 Rss
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	N/A*	1.41 (+1.5 dB)	1.41 (+1.5 dB)
	Channel ID, Label	7 Lrs	8 Rrs	/			
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)				



No. of Channels		Channel ordering and channel weighting					
10 channels (4+5+0)	Channel ID, Label	1 L	2 R	3 C	4 LFE	5 Ls	6 Rs
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	N/A*	1.41 (+1.5 dB)	1.41 (+1.5 dB)
	Channel ID, Label	7 Tfl	8 Tfr	9 Tbr	10 Tbr		
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)		
12 channels (4+7+0)	Channel ID, Label	1 L	2 R	3 C	4 LFE	5 Lss	6 Rss
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	N/A*	1.41 (+1.5 dB)	1.41 (+1.5 dB)
	Channel ID, Label	7 Lrs	8 Rrs	9 Tfl	10 Tfr	11 Tbr	12 Tbr
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)
24 channels (9+10+3)	Channel ID, Label	1 FL	2 FR	3 FC	4 LFE1	5 BL	6 BR
	Weighting	1.41 (+1.5 dB)	1.41 (+1.5 dB)	1.00 (±0.0 dB)	N/A*	1.00 (±0.0 dB)	1.00 (±0.0 dB)
	Channel ID, Label	7 FLc	8 FRc	9 BC	10 LFE2	11 SiL	12 SiR
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	N/A*	1.41 (+1.5 dB)	1.41 (+1.5 dB)
	Channel ID, Label	13 TpFL	14 TpFR	15 TpFC	16 TpC	17 TpBL	18 TpBR
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)
	Channel ID, Label	19 TpSiL	20 TpSiR	21 TpBC	22 BtFC	23 BtFL	24 BtFR
	Weighting	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)	1.00 (±0.0 dB)

\* The LFE channels are not included in a Recommendation ITU-R BS.1770 measurement.