

TECHNICAL SPECIFICATION



**Guideline for synchronization of audio and video –
Part 1-1: Measurement methods for synchronization of audio and video
equipment and systems – General**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2018 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

TECHNICAL SPECIFICATION



**Guideline for synchronization of audio and video –
Part 1-1: Measurement methods for synchronization of audio and video
equipment and systems – General**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.160.01

ISBN 978-2-8322-6218-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	7
4 Measuring conditions.....	8
4.1 General conditions.....	8
4.1.1 Power supplies	8
4.1.2 Environmental conditions.....	8
4.2 Specific conditions.....	8
4.3 General settings.....	8
4.4 Specific settings.....	9
5 Measurement methods	9
5.1 General block diagram	9
5.2 Test signal source and test signal	9
5.2.1 General	9
5.2.2 Signal generator	10
5.2.3 Test disc.....	10
5.3 EUT	10
5.3.1 Equipment	10
5.3.2 Compound equipment.....	12
5.4 Measuring instruments.....	12
5.4.1 General	12
5.4.2 Measurement of signal.....	13
5.4.3 Measurement of reproduced signal	13
5.4.4 Specific requirement	13
Annex A (informative) Assessment of the result of measurement	14
Annex B (informative) General measurement and test method of audio latency	15
B.1 Measurement.....	15
B.2 Test signal	15
B.3 Test method.....	15
Bibliography.....	16
Figure 1 – General block diagram for measurement	9
Figure 2 – Audio and video device	10
Figure 3 – Source device	11
Figure 4 – Display device.....	11
Figure 5 – Recorder device	12
Figure 6 – Compound equipment	12
Figure 7 – Measurement of reproduced signal	13
Figure B.1 – block diagram of test.....	15

Table B.1 – Frequency range of test signal15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDELINE FOR SYNCHRONIZATION OF AUDIO AND VIDEO –

Part 1-1: Measurement methods for synchronization of audio and video equipment and systems – General

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62312-1, which is a technical specification, has been prepared by technical area 11: Quality for audio, video and multimedia systems, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This second edition cancels and replaces the first edition published in 2008. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) new Annex B informs of general measurement and test method of audio latency;
- b) comments from SMPTE (including small technical issues).

The text of this Technical Specifications is based on the following documents:

Enquiry draft	Report on voting
100/3048/DTS	100/3105/RVDTS

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all the parts of IEC 62312, published under the general title *Guideline for synchronization of audio and video*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

Audio and video equipment processes or reproduces the input signals of audio and video, then outputs these signals in various forms. Audio and video equipment needs time to process or reproduce the input signal. This time depends on the signal format, the architecture of the equipment and the design of the equipment. Hence, audio and video equipment may have different output delays for audio and video signals, and this causes unsynchronised audio and video outputs.

This Technical Specification is the general part of the measurement method for that time difference between audio and video outputs. The other parts of IEC ~~TS~~ 62312-1 describe specific measurement methods for specific audio and video equipment.

GUIDELINE FOR SYNCHRONIZATION OF AUDIO AND VIDEO –

Part 1-1: Measurement methods for synchronization of audio and video equipment and systems – General

1 Scope

The IEC 62312 series gives guidelines for methods of ~~synchronization of~~ synchronizing audio and video.

This part of IEC 62312-1 describes general measurement methods for the synchronization of audio and video equipment.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TS 62312-2:2018, *Guideline for synchronization of audio and video – Part 2: Methods for synchronization of audio and video systems*

3 Terms, definitions and abbreviated terms

~~For the purposes of this document, the following terms and definitions apply. Also the terms and definitions given in IEC 62312-2 apply.~~

~~3.1~~

~~EUT~~

~~equipment under test~~

3.1 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.2 Abbreviated terms

EUT equipment under test

4 Measuring conditions

4.1 General conditions

4.1.1 Power supplies

4.1.1.1 Voltage

The supplied AC power voltage shall be the fixed value of the region where the equipment under test is used. The supplied DC power voltage shall be the fixed value specified by the manufacturer. The tolerance shall be within ± 1 % in both cases. If this tolerance does not affect the results of measurement, the tolerance can be within ± 5 %.

4.1.1.2 Frequency

The frequency of the AC power supply shall be 50 Hz or 60 Hz and the fluctuation shall be within ± 2 %.

4.1.1.3 Waveform distortion

4.1.1.3.1 AC power supply

The waveform of the AC power supply shall be a sine wave in which the harmonic content is 2 % or less.

4.1.1.3.2 DC power supply

The ripple voltage shall be 0,1 % or less.

4.1.2 Environmental conditions

4.1.2.1 Environmental air condition

The environmental conditions for measurements shall be:

Ambient temperature: 20^{+15}_{-5} °C
Relative humidity: 60 % $\pm$ 15%
Air pressure: 96 kPa $\pm$ 10 kPa

4.1.2.2 Warm up

The equipment under test shall be powered on 5 min before starting the test. It may be zero if the warm up does not affect the results of the measurement.

4.1.2.3 Initialization

The equipment under test shall be initialized before starting the test.

4.2 Specific conditions

If specific conditions are required for the measurement of the equipment, those conditions shall be specified.

NOTE ~~The other subparts of IEC 62312-1 specify~~ IEC TS 62312-2 specifies the measurement method for the specific equipment; the special conditions ~~may be~~ are specified in that part.

4.3 General settings

General settings for equipment shall be set to the default setting, which is specified by the manufacturer, normally the centre position. If there ~~will be~~ is no special indication ~~for all~~.

the functions that affect the results of measurement of synchronization, all ~~of the~~ controllers shall be switched off.

4.4 Specific settings

~~If specific equipment has its own specific settings, it shall be set to have the results of measurement regarding the specific settings. The other subparts of IEC 62312-1 specify specific settings for specific equipment.~~

If a piece of equipment has its own specific settings, it shall be set to have the results of measurements related to those specific settings.

5 Measurement methods

5.1 General block diagram

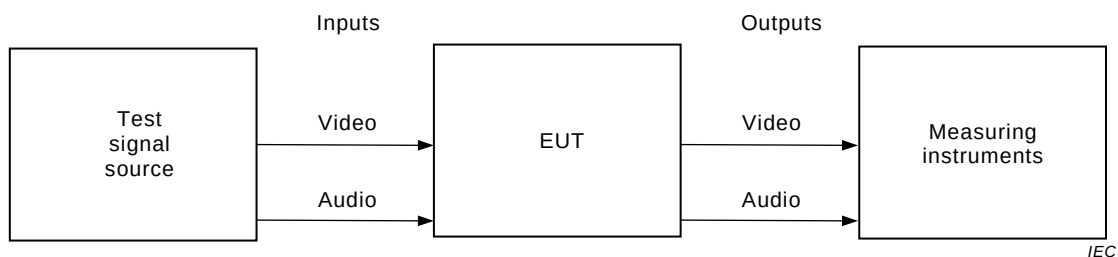


Figure 1 – General block diagram for measurement

The test signal source provides the reference audio and video signal. There is either no time difference between them or the difference is specified. These audio and video test signals are applied to the EUT in the appropriate method for each EUT. The EUT reproduces or processes these test signals and outputs the audio and video signals. The measuring instruments measure the output from the EUT and measure the time difference between audio and video outputs from the EUT.

The test signal source outputs the signal in a format that should be suitable for the EUT to process.

In the case that the EUT, such as an audio amplifier, reproduces no video signal, general measurement and the test method of audio latency is available as described in Annex B.

5.2 Test signal source and test signal

5.2.1 General

The test signal source provides audio and video test signals as a reference signal for measuring. The content, format and media of the test signal are different depending on the EUT.

The basic format of the test signal content consists of synchronized audio and video signals that are used as a reference for synchronization and are processed or reproduced by the EUT. The EUT outputs the resulting signal to the measuring instruments. The output signal should be detectable and be able to be measured by the measuring instruments. To conform to this requirement, the test signal content should be made suitable for the measuring instruments.

The form of the test signal is an electrical signal or a signal recorded on media. The format and media of the test signal should be appropriate for the EUT. This would normally be the default format and media appropriate to the functionality of the EUT.