SLOVENSKI STANDARD
oSIST prEN IEC 60268-16:2019

01-maj-2019

Oprema za zvokovne sisteme - 16. del: Objektivno ocenjevanje govorne razumljivosti z uporabo indeksa prenosa govora

Sound system equipment - Part 16: Objective rating of speech intelligibility by speech transmission index

Elektroakustische Geräte - Teil 16: Objektive Bewertung der Sprachverständlichkeit durch den Sprachübertragungsindex

Equipements pour systèmes électroacoustiques - Partie 16: Evaluation objective de l'intelligibilité de la parole au moyen de l'indice de transmission de la parole

Ta slovenski standard je istoveten z: **prEN IEC 60268-16:2019**

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33.160.30	Avdio sistemi	Audio systems

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100/3202/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TA 20 : ANALOGUE AND DIGITAL AUDIO	
SECRETARIAT: Japan	SECRETARY: Mr Gen Ichimura
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
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TITLE:

Sound system equipment - Part 16: Objective rating of speech intelligibility by speech transmission index

PROPOSED STABILITY DATE: 2022

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SOUND SYSTEM EQUIPMENT –

Part 16: Objective rating of speech intelligibility by speech transmission index

FOREWORD

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International Standard IEC 60268-16 has been prepared by IEC technical committee 100: Audio, video and multimedia equipment and systems.

This fifth edition cancels and replaces the fourth edition, published in 2011, and constitutes a technical revision.

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

The spectrum of the male speech test signal has been changed, with significant reductions in the 125 Hz and 250 Hz bands being implemented. Some corrections to formulae have been made. Additional information has been included on prediction and measurement procedures.

NOTE See Introduction for a historical summary referring to the various changes from the first to the fifth edition (current edition).

The text of this standard is based on the following documents:

FDIS	Report on voting
100/XX/FDIS	100/XX/RVD

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

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

The committee has decided that the contents of this publication will remain unchanged until the stability date[1] indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual edition of this standard may be issued at a later date.

INTRODUCTION

Speech is considered to be the major method of communication between humans. In many situations the speech signal is degraded by the signal path or the transmission channel between talker and listener, resulting in a reduction of the intelligibility of the speech at the listener's location.

To quantify the deterioration of the speech intelligibility induced by the transmission channel, a fast and objective measuring method was developed; the Speech Transmission Index (STI).

The STI method applies a specific test signal to the transmission channel and by analysing the received test signal; the speech transmission quality of the channel is derived and expressed in a value between 0 and 1, as the Speech Transmission Index (STI). Using the obtained STI-value, the potential speech intelligibility can be determined.

Although there are limitations to the STI method, the use of STI has proved useful in many situations and has gained international acceptance.

The STI method has been the subject of ongoing development and refinement since its introduction in the 1970s. Major improvements of the STI have been consolidated by incorporating them in successive revisions of IEC 60268-16.

To avoid misinterpretation of STI results, it is important that all users of STI understand the basic principles behind the operation of STI, the application domain and STIs limitations. This standard provides substantial information to assist users.

Potential applications of STI

STI may be used to measure the potential intelligibility of a wide range of electronic systems and acoustic environments. Typical applications include:

- measurement of public address and sound reinforcement systems;
- measurement and Certification of emergency sound and communication systems;
- measurement of communication channels and systems such as intercoms and wireless communication;
- measurement of potential speech intelligibility and communication in rooms and auditoria;
- evaluation of direct speech communication (situations without electronic amplification) in rooms or acoustic spaces including vehicles;
- evaluation of the potential intelligibility of Assistive Hearing Systems;

NOTE The STI method was not designed for the measurement and evaluation of speech privacy or speech masking systems and therefore has not been validated for these situations. It is not recommended to use STI below 0.3, but if this is to be undertaken, specialist expertise and techniques beyond the scope of this standard are required.

Potential users of STI

The range of users of STI measurements is diverse. Among the users who might apply this method are:

- certifiers of voice alarm and other types of emergency systems;
- certifiers of sound reinforcement and audio systems;
- audio and telecommunication equipment manufacturers;
- audio and communication engineers;
- acoustic and electroacoustic consultants;
- audio and telecommunication equipment manufacturers;

- sound system installers;
- researchers into STI methods and developers of instruments to measure STI.

Table 1 How to use this standard

Purpose	Topic	Clauses
All users	Introduction to the STI method	
Routine check of voice-alarm or sound system with STIPA	Direct method of measuring STI	4.0
In-depth check of or to certify sound system with STIPA and/or impulse response methods	Description of the STI method	5.0
	Direct method of measuring STI	4 and 5
	Indirect method of measuring STI using the impulse response	4 and 6
	Measurement procedures, and applications	8.0
	Post-processing of measured MTF data	8.8
	Limitations of the measurement methods	5.4, 6.3
	Optional: Theory and equations governing STI methods	Annexes A and B
	Optional: Relationship between subjective and objective measures of intelligibility	Annex F
	Optional: Measurement uncertainties	Annex E
Measure telecommunication equipment	Direct method only	8.6.2
Manufacturer of STIPA device	Theory and equations governing STI methods	Annexes A and B
	Verification of STI measurement device performance	Annex C
	Information to be provided	Annex D
Manufacturer of acoustical analyser and simulation software	Theory and equations governing STI methods	Annex A
	Calibration of STI instruments	Annex C
	Information to be provided	Annex D
Research into intelligibility	Theory and equations governing STI methods	Annex A and B
Using simulation software	Prediction methods	Annex M
Post processing of STI and STIPA measurement	Post processing measurement results	Annex M
	Optional - As per in-depth measurements of STI listed above	
	Optional -Worked calculation example	Annex N
Evaluation of the potential intelligibility of Assistive Listening Systems	As per in-depth measurements of STI listed above	
	Special process for Assistive Listening Systems	8.6.3

Items that have changed in Revision 5.

Specific changes that have been incorporated in this revision are:

– changes to the male speech spectrum shown in Table A.4

– corrections to an equation in Annex L

– Greater information is given in Annex M about adjustments to the measured STI results to simulate the effects of alternative ambient noise and speech levels.

– Greater displayed precision is given for the results of the example calculation in Annex M.

– Correction of Schroeder equation for MTF in Clause 6.1.
– Spectrum and weighting factors for female speech have been removed.
– Verification information for STI measurement devices added

Revision history

The history of revisions is as follows:

- Revision 1: 1988. In the first version of the STI standard, a gender-independent test signal spectrum was used.
- Revision 2: 1998. Gender specific test signals were introduced, for male and female talkers, each gender relating to a specific set of weighting factors. In addition, weightings were introduced for redundancy factors. The term STI_r was introduced to signify the use of these redundancy factors.
- Revision 3: 2003. Important differences between Revision 2 and Revision 3 are the introduction of:
    - level dependent masking functions,
    - the STI derivative STIPA.
    - STIPA was specially developed as a fast measurement method that could deal with electro-acoustic and acoustic effects while determining the speech transmission quality of PA systems.
- Revision 4: 2011.
    - The terms STI_r and Room Acoustic Speech Transmission Index (RASTI) were discontinued.
    - A new function for the prediction of auditory masking effects was introduced.
    - STI corrections for non-native language listeners and some forms of hearing loss were introduced.

SOUND SYSTEM EQUIPMENT –

Part 16: Objective rating of speech intelligibility by speech transmission index

1 Scope

This standard defines the STI model, test signals, measurement and prediction methods.

The objective of this standard is to provide a comprehensive manual for all types of users of the STI model in the fields of audio, communications and acoustics.

This standard does not provide STI criteria for certification of transmission channels; e.g. criteria for a voice-alarm system, but some typical application values are provided in Annex G.

Every measurement method has limitations, and the reader is referred to clauses relating to limitations such as speech privacy, echo and systems using digital voice compression (vocoders).

This standard does not cover the case of fluctuating noise on the STI, although some general comment on dealing with this complex issue is provided in 7.13 and 8.9.3

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61260-1:2014 Electroacoustics - Octave-band and fractional-octave-band filters - Part 1: Specifications

ISO 9921:2003, *Ergonomics — Assessment of speech communication*

ISO 18233:2006, Acoustics — Application of new measurement methods in building and room acoustics

IEC 60318-1:2009 Electroacoustics - Simulators of human head and ear – Ear simulator for the measurement of supra-aural and circumaural earphones

IEC 60318-7:2011 Electroacoustics - Simulators of human head and ear – Head and torso simulator for acoustic measurement of hearing aids

ITU-T P.58 Head and torso simulator for telephonometry (International Telecommunication Union, Geneva Switzerland 2011)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. 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