SLOVENSKI STANDARD
SIST ETS 300 753 E1:2006

01-februar-2006

Inġeniring opreme (EE) ï Akustiļ ni ġum, ki ga oddaja telekomunikacijska oprema

Equipment Engineering (EE); Acoustic noise emitted by telecommunications equipment

Ta slovenski standard je istoveten z: ETS 300 753 Edition 1

ICS:

17.140.20	Emisija hrupa naprav in opreme	Noise emitted by machines and equipment
33.050.01	Telekomunikacijska terminalska oprema na splošno	Telecommunication terminal equipment in general

SIST ETS 300 753 E1:2006 **en**

EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 753

October 1997

Source: EE

Reference: DE/EE-01023

ICS: 33.020

Key words: Acoustic, emission, environment, noise

Equipment Engineering (EE); Acoustic noise emitted by telecommunications equipment

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 4 92 94 42 00 - Fax: +33 4 93 65 47 16

Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Equipment Engineering (EE) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Transposition dates	
Date of adoption:	19 September 1997
Date of latest announcement of this ETS (doa):	31 December 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	30 June 1998
Date of withdrawal of any conflicting National Standard (dow):	30 June 1998

Introduction

Compatibility with the end-use environment is a primary concern for purchasers and manufacturers of telecommunications equipment. An important compatibility issue is the amount of acoustic noise emitted by the equipment. This ETS is intended to meet four primary needs of purchasers and manufacturers with regard to this issue:

- specification of acoustic noise emission measurement methods;
- specification of acoustic noise emission limits;
- specification of a method for reporting acoustic noise emission;
- specification of a method for verification of declared noise emission values.

To develop practical specifications and to have the capacity to make fair comparisons between equipment, it is essential to have a single, technically established method for the measurement of acoustic emission. Therefore, this ETS specifies the use of sound power measurement and, more specifically, adopts ISO 7779 [1] as the primary measurement document.

Sound power levels can be used for direct comparison of noise emission for functionally similar equipment manufactured by different vendors, and/or in the calculation of estimated sound pressure levels for spaces where the equipment is to be installed. The use of sound *power* level, instead of emission sound *pressure* level, as the specified quantity for product noise emission has clear precedent within the international noise control community.

The acceptability of the acoustic emission from a piece of equipment depends upon a number of details that vary from installation to installation, and the number of possible installations is extensive. Accordingly, the goal of this ETS is to specify limits that are applicable to the major installation categories.

The fundamental concern prompting the development of this ETS is the potential adverse impact that excessive equipment noise can have on people. For that reason, the impact of noise upon human activities has been carefully considered, and the intent has been to ensure that the acoustic noise emitted is at, or below, generally accepted levels. The perceptual issues considered included task concentration, speech communication, annoyance and other similar parameters. Generally, the relevant noise exposure levels are well below those needed to ensure worker safety and health. Requirements related to worker safety and health (including those related to infrasound and ultrasound) can be found in EEC Directive 86/188/EEC [4].

This ETS specifies that manufacturers report measured A-weighted sound power values for equipment. Given that it is impractical and unnecessary to measure every manufactured unit, the reported sound power value should be one that all, or nearly all, units of a particular model will not exceed. This means that the reported value needs to take into account both production variation and the precision of the measurement method. ISO 9296 [2] specifies methods that address these issues and is therefore specified in this ETS as the method for declaring sound power values. ISO 9296 [2] also specifies a method for verification of declared sound power values.

For further information regarding the motivation for the development of this standard, see annex D.

1 Scope

This European Telecommunication Standard (ETS) specifies acoustic noise emission limits for equipment used in telecommunication locations as specified in the ETS 300 019-1 [3] series. This ETS covers switching, transmission, power, supervisory, as well as tariff and billing equipment.

This ETS also specifies methods for measuring, reporting and verifying the noise emission of telecommunications equipment. The details of the methods are found in ISO 7779 [1] and ISO 9296 [2]. The descriptor used to quantify acoustic noise emission is the declared A-weighted sound power level in units of bels.

The limits contained herein apply only to the airborne acoustic noise generated by equipment during normal operation. That is, the limits do not apply when operating under emergency conditions or when the equipment is being serviced. Also, the limits do not apply to equipment features which produce sound as an intentional aspect of their operation, e.g. alarm signals, attention signals, speech signals and so on. (For more information on that topic, see ETR 116 [5]). Furthermore, the present document does not specify maximum sound pressure level limits in specific environments.

Contained within the present document are 6 annexes. Annex A specifies methods for measuring the acoustic noise emitted from equipment manufactured for open air outdoor locations. Annex B contains tables of recommended A-weighted sound power limits for open air outdoor equipment. Annex C discusses the emission of pure tones from equipment. Annex D reviews the motivation for the creation of this ETS. Annex E discusses the relationship between sound power and sound pressure. Annex F briefly summarizes the sound power measurement methods used within this ETS.

2 Normative references

This ETS incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ISO 7779: "Acoustics - Measurement of Airborne Noise Emitted by Computers and Business Equipment".

[2] ISO 9296: "Acoustics - Declared Noise Emission Values of Computer and Business Equipment".

[3] ETS 300 019-1 (1994): "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1: Classification of environmental conditions" (this ETS has eight sub-parts).

[4] EEC Directive 86/188/EEC: "On the Protection of Workers From the Risks Related to Exposure of Noise at Work" [OJ L 137 24.05.86 p.28 modified by L 001 03.01.94 p.484].

[5] ETR 116 (1994): "Human Factors (HF); Human factors guidelines for ISDN Terminal equipment design".

[6] ECMA TR/27: "Method for prediction of installation noise levels".

3 Definitions and symbols

3.1 Definitions

For the purposes of this ETS, the following definitions apply.

The following terms have the meanings as defined in ISO 7779 [1] and ISO 9296 [2], which are here repeated for the sake of convenience:

sound power level (L_W): The logarithm (base 10) of the ratio of a given sound power to the reference sound power. The weighting network (A-weighting) or the width of the frequency band used needs to be indicated. The reference sound power is 1 pW. Units: bels.

declared A-weighted sound power level (L_{WAd}): A statistical maximum A-weighted sound power level for manufactured units, taking into account tolerances of production and measurement variance, described in ISO 9296 [2]. Units: bels.

NOTE 1: Typically, L_{WAd} is 0,3 bels higher than the A-weighted sound power level measured on an average manufactured unit. L_{WAd} is used for all equipment classes and in the specification of noise emission limits.

sound pressure level (L_P): Ten times the logarithm (base 10) of the ratio of the time-mean-square sound pressure to the square of the reference sound pressure. The weighting network (A-weighting) or the width of the frequency band used needs to be indicated. The reference sound pressure is 20 µPa. Units: decibels.

A-weighting filter: Response characteristic of a filter used in acoustic measurement systems which attenuates low frequency and high frequency acoustic energy. This filter is used to provide a frequency response characteristic similar to that of the human auditory system.

The following definitions are peculiar to this ETS:

high temperature A-weighted sound power level (HL_{WAd}): A statistical maximum A-weighted sound power level for manufactured units, taking into account tolerances of production and measurement variance. The method for determining the high temperature A-weighted sound power level is similar to that used in the determination of declared sound power values, as described in ISO 9296 [2]. HL_{WAd} is used for equipment whose operational noise varies with temperature. Units: bels.

high temperature limit: The maximum temperature specified for the stated environmental class of the equipment under test according to the relevant subpart of ETS 300 019-1 [3].

telecommunication equipment room: An area dedicated to large telecommunication systems. Unattended rooms are typically occupied only for service and maintenance activities. These activities may last for periods of time greater than one hour.

business area: An area where the principal activity is office / clerical work or similar activities. These areas typically contain multiple single-person work areas. Sound levels should be low enough to provide good conditions for task concentration and speech communication.

office: An area where individuals are primarily engaged in individual or small group intellectual tasks which require excellent conditions for task concentration and speech communication. A typical example would be a single-person closed office.

power room: Defined as an area designed to house heavy equipment including, but not limited to, power generation equipment, heating equipment, and ventilation equipment. Typically occupied only for short periods during servicing.

underground vault: Defined as a sealed underground enclosure which is large enough to be entered for servicing equipment contained therein. Typically occupied only for service and maintenance activities. These activities may last for periods of time greater than one hour.

protected area: Location intended to be used for rest, recuperation and contemplation.

NOTE 2: There is no IEC description for this class but there is a requirement of some European countries for this special category. These areas could be adjacent to hospitals, churches, libraries, etc.

rural: Relating to areas, typically, in the countryside with low population density.

urban: Relating to areas, typically, in towns and cities with high population density.

industrial: Relating to areas, typically, of transient population and heavy manufacturing activity.

daytime: The part of the day considered to extend over normal waking hours. Typically, the period during which people are most likely to be engaged in activities related to business, education, active recreation, etc.

night-time: The part of the day considered to be normal sleeping hours. This period includes evening and early morning hours when people are likely to be awake but not yet fully involved in typical daytime activities.

3.2 Symbols

For the purposes of this ETS, the following symbols apply:

L_W	sound power level
L_{WAd}	declared A-weighted sound power level
L_p	sound pressure level
HL_{WAd}	high temperature declared A-weighted sound power level

4 Measurement methodology

The measurement methods specified in ISO 7779 [1] shall be used for determining the sound power of products. Annex A contains additional methods and measurements relating to open air outdoor equipment.

5 Installation and operation of equipment

The installation and operation conditions specified in ISO 7779 [1] shall be used for determining the sound power of products. Where there are differences between this ETS and ISO 7779 [1], the requirements contained herein shall be followed.

The equipment shall be configured and operated according to its normal intended use. Within that constraint and the constraints specified below, the equipment shall be configured and operated to ensure worst case acoustic noise emission.

5.1 Equipment installation

The specific installation will depend upon the sound power measurement technique being used (reverberation room or free-field over a reflecting plane), and upon the normal installation requirements of the equipment being measured.

5.2 Equipment operation "in-use"

For telecommunication equipment whose operational noise varies with functional load, the electrical input and load conditions of the equipment shall be chosen to obtain full functional utilization of the equipment under test. Dissipation shall be maximized by selection of supply power and load conditions.

Only the sound power of continuous, steady-state noise sources shall be measured. Therefore, the equipment is to be operated such that intermittent sources are not active. Such sources include (but are not restricted to) alarms, attention signals, printing mechanisms, disk-drive seeking mechanisms and so on.