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| **Abstract:** | This document contains an update to the current draft of new WHO-ITU H.SL-ES "Global standard for safe listening in video gaming and esports" that was created at the SG16 meeting in Geneva, 10-21 July 2023, as found in SG16-TD86/WP2 (2023-07) [1]. These updates build upon the feedback received during the ITU/WHO stakeholder consultation workshop held in Geneva, 28-29 September 2023 [2]. |

References:

1. [SG16-TD86/WP2 (2023-07)](http://www.itu.int/md/T22-SG16-230710-TD-WP2-0086), *H.SL-ES "Global standard for safe listening in video gaming and esports" (New): Initial draft (Geneva, 10-21 July 2023)*
2. [Joint ITU/WHO Workshop on Developing Standards for Safe Listening in Video Gaming and Esports Activities](https://www.itu.int/en/ITU-T/Workshops-and-Seminars/2023/0928), Geneva, 28-29 Sep 2023

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Draft New Recommendation ITU-T H.SL-ES

Safe listening for video gaming and esports

Summary

This standard is aimed at reducing the risk of hearing loss among gamers and people involved in esports and video gameplay. It is intended to be aligned with the principles of sound levels, exposure measurement and communication outlined in ITU-T-H.870.

Keywords

Standard; Safe listening; esports; video gameplay, gaming; sound-induced hearing loss

Introduction

Globally, over 1 billion people 12-35 years old are at risk of hearing loss due to unsafe listening in recreational settings. To address this, WHO launched the *Make Listening Safe* initiative aimed to promote safe listening and reduce hearing loss.

Amongst the outputs of this initiative was the WHO/ITU [H.870](https://www.itu.int/rec/T-REC-H.870) standard for safe listening devices and systems. This standard aims to promote safe listening and minimize the risk of hearing loss among users of personal audio devices/systems. However, video gameplay devices, including those used in electronic sports (esports) are not covered by this standard. Esports and video gaming are rapidly becoming one of the largest entertainment industries worldwide reaching over 3 billion people, with approximately 1.7 billion gamers participating in video gameplay via a personal computer (PC) or a video game console (that are most likely to be playing with sound on or using headphones).

From a public health perspective, video gameplay and esports expose players to risky health behaviours including prolonged exposure to loud sounds. It is the responsibility of public health and standardization agencies, governments and industry to ensure that the health risks associated with esports and video gameplay gaming are minimized including the promotion of safer listening practices. For these reasons, WHO and ITU intend to develop a universal standard for safe listening in esports and video gameplay. This standard will likely include the standardization of sound levels, sound exposure measurement, information provision, and warnings.

# Scope

This document provides comprehensive safe listening guidelines that encompass a diverse array of video gameplay platforms, including PC, video game console, handheld, and mobile devices. The scope further extends to live, in-person esports competitions that involve audiences and amplified sound systems, as well as video gameplay audio peripherals, including video gameplay -focused headphones and headsets, which are regularly used in either in home entertainment or esports contexts.

These guidelines are designed to ensure auditory health and prevent hearing damage for players (also known as 'gamers'), participants, and spectators across a wide spectrum of video gameplay scenarios and equipment.

# References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

|  |  |
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| [ITU-T H.870] | Recommendation ITU-T H.870 (V2) (03/2022), Guidelines for safe listening devices/systems |
| [WHO] | *Global standard for safe listening for live venues and events* |
| [EN 50332-1] | CENELEC EN 50332-1:2013, Sound system equipment: Headphones and earphones associated with personal music players. Maximum sound pressure level measurement methodology. General method for "one package equipment". |
| [EN 50332-2] | CENELEC EN 50332-2:2013, Sound system equipment: Headphones and earphones associated with personal music players. Maximum sound pressure level measurement methodology. Matching of sets with headphones if either or both are offered separately, or are offered as one package equipment but with standardised connectors between the two allowing to combine components of different manufacturers or different design. |
| [EN 50332-3] | CENELEC EN 50332-3:2017, Sound system equipment: Headphones and earphones associated with personal music players – Maximum sound pressure level measurement methodology – Part 3: Measurement method for sound dose management. |
| [IEC 62368-1] | IEC 62368-1:2018, Audio/video, information and communication technology equipment – Part 1: Safety requirements. |
| [ITU-T G.100.1] | Recommendation ITU-T G.100.1 (2015), The use of the decibel and of relative levels in speechband telecommunications. |
| [ISO 226] | ISO 226:2003, Acoustics – Normal equal-loudness-level contours. |
| [ISO 11904-1] | ISO 11904-1:2002, Acoustics – Determination of sound immission from sound sources placed close to the ear – Part 1: Technique using a microphone in a real ear (MIRE technique). |

# Definitions

## Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

**3.1.1 acoustic reflex threshold []:** The sound pressure level (SPL) at which a sound stimulus triggers stapedius muscle reflex (SMR).

**3.1.2 acoustic trauma []:** A single exposure to sound resulting in immediate injury to the auditory system.

**3.1.3 calculated sound dose [IEC 62368-1]:** One-week rolling estimate of sound exposure expressed in percent of the maximum regarded as safe.

NOTE – See B.4 of [EN 50332-3] for additional information.

**3.1.4 damage-risk criteria []:** An archaic term referring to the risk of noise induced hearing loss (NIHL) presented by various levels of noise exposure. In this Recommendation this term is replaced with several preferred contemporary terms: 'dose-response relationship', 'risk', or 'exposure limit'.

**3.1.5 dBA []:** Decibels of sound pressure level measured using the A-weighting network [IEC 61672] and ]IEC 60268-1], see also Figure II.2; a frequency weighting intended to measure low-intensity noise (around 40 phon loudness level) but which has also become commonly used for measuring occupational and environmental noise exposures.

NOTE – The latter use is based on studies of noise-exposed workplace populations in the 1950s and 1960s. That work recommended the use of A-weighting given both its availability in sound level meters and its ability to predict the dose-response relationship over the noise spectra studied [b-Burns-1973] and [b-Burns-Robinson]. Subsequent to that work, the analyses of noise exposed populations upon which the weekly sound allowance in this document are based used A-weighting in measuring noise exposure [b-Neitzel] and [b-Fligor].

**3.1.6 dBFS []:** dB full scale is the signal level of a digital signal relative to its overload or maximum level. Different conventions exist. It is common to assign a digital representation of a full-scale sinusoidal the value of 0 dBFS RMS. The peak level can then reach +3.01 dBFS. In other cases, the RMS level of a digital full-scale square wave is assigned 0 dBFS RMS. The maximum peak level is then also 0 dBFS. For the latter cases, dBFS is equivalent to dBov. (dBov: dB relative to digital overload is the signal level of a digital signal relative to its overload or maximum level. See [ITU-T G.100.1].)

**3.1.7 dBHL []:** Decibels of hearing level at a certain frequency; a level used to measure an audiometric hearing threshold relative to the level defined as normal.

NOTE – It is the ear's sensitivity in a human with normal hearing, at different frequencies, that is the reference. Figure 1 of [ISO 226] shows standardized equal-loudness contours at different sound levels and a mapping of phon (loudness) against dB SPL (level). The two scales meet at 1 kHz. dB SPL is by definition referenced at the threshold of hearing at 1 kHz, i.e., 0 phon (and 0 dB SPL).

**3.1.8 diffuse-field frequency response of HATS (sound pick-up) [ITU-T P.58]:** Difference, in dB, between the third-octave spectrum level of the acoustic pressure at the ear-drum reference point (DRP) and the third-octave spectrum level of the acoustic pressure at the HATS reference point (HRP) in a diffuse sound field with the HATS absent.

**3.1.9 diffuse sound field []:** A field where at any position in the medium, sound is incident from all directions with equal intensities and random phase. The reverberant sound does not vary with receiver position. (Adapted from [b-Vér].)

**3.1.10 (sound) dose []:** The total quantity of sound energy received by the human ear during a specified period. In the context of this Recommendation, it is the same as sound exposure (see clause 3.1.14). The unit of (sound) dose is Pa2h.

**3.1.11 dosimetry []:** The calculation and assessment of the dose received by the human ear.

**3.1.12 eardrum reference point [b-ITU-T P.10]:** A point located at the end of the ear canal, corresponding to the eardrum position.

**3.1.13 equal energy principle []:** The premise that the total effect of sound is proportional to the total amount of sound energy received by the ear, irrespective of the distribution of that energy in time. According to this principle, equal amounts of sound energy are expected to cause equal amounts of sound induced permanent threshold shift regardless of the distribution of the energy across time. This principle allows the question of hearing damage risk posed by a sound exposure to be related to a sound dose.

**3.1.14 equivalent continuous A-weighted sound pressure level []:** A continuous sound pressure level (SPL) in dBA which is considered to pose the same risk as a time-varying SPL, calculated using a 3-dB exchange rate between level and time. Mathematically, it is represented as:

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where:

*L*Aeq*,T* is the equivalent continuous A-weighted sound pressure level re 20 μPa, determined over a time integration interval *T = t*2 *– t*1

*p*A *(t)* is the instantaneous A-weighted sound pressure of the sound signal

p0 is the reference sound pressure of 20 μPa.

**3.1.15 equivalent continuous average sound level normalized []:** A continuous SPL in dBA which is considered to pose the same risk as a certain time-varying SPL pattern measured using a 3-dB exchange rate and normalized to an n-hour exposure period. For example, the value for n could be 8, in which case this may also be referred to as an LA8hn or LEX8h", or n=40, LEX40h.

**3.1.16 excess risk []:** The risk of sound induced hearing loss (SIHL) associated with a specific amount of exposure.

**3.1.17 exchange rate []:** The change in average noise level (in dB) that corresponds to a doubling or halving of allowable exposure time.

**3.1.18 free sound field [ISO 3745]:** A field in a homogenous, isotropic medium free of boundaries.

**3.1.19 free-field frequency response of HATS (sound pick-up) [ITU-T P.58]:** Difference, in dB, between the third-octave spectrum level of the acoustic pressure at the ear-drum reference point (DRP) and the third-octave spectrum level of the acoustic pressure at the HATS reference point (HRP) in a free sound field with the HATS absent (test point).

**3.1.20 frequency response []:** In this context, frequency response is short for "sensitivity vs. frequency response", sometimes referred to as the "tone curve" of an audio device, such as a headphone, loudspeaker, microphone, amplifier, etc.

**3.1.21 head and torso simulator (HATS) [b-ITU-T P.10]:** Manikin extending downward from the top of the head to the waist, designed to simulate the sound pick-up characteristics and the acoustic diffraction produced by a median human adult and to reproduce the acoustic field generated by the human mouth.

**3.1.22 hearing threshold level []:** Sound pressure level (SPL) at specific audiometric test frequencies, measured in dBHL.

**3.1.23 instructed person [IEC 62368-1]:** Instructed person is a term applied to persons who have been instructed and trained by a skilled person, or who are supervised by a skilled person, to identify energy sources that may cause pain (see Table 1) and to take precautions to avoid unintentional contact with or exposure to those energy sources. Under normal operating conditions, abnormal operating conditions or single fault conditions, instructed persons should not be exposed to parts comprising energy sources capable of causing injury.

**3.1.24 listening device []:** A wearable device used to deliver sound to the ear.

Consists of a transducer and fitting to accommodate in the ear, on the ear or over the ear listening. Examples are headphones and earphones.

Headphones and earphones may include amplifiers and other electronics, such as for wireless or digital connection, signal processing, noise cancellation, or even media storage for subsequent playback. As such, headphones and earphones with such functionality could be classed as personal audio systems.

NOTE – The principle of classifying energy sources and proscribing safeguards against those sources is enshrined in [IEC 62368-1], on which much of this Recommendation is based.

**3.1.25 Loudness K-weighted Full Scale (LKFS) [BS.1770-5]:** This designation signifies: Loudness, K-weighted, relative to nominal full scale. The LKFS unit is equivalent to a decibel in that an increase in the level of a signal by 1 dB will cause the loudness reading to increase by 1 LKFS.

**3.1.26 Loudness Unit []:** the unit of measurement used in the process of quantifying a digital recording's perceived loudness by analysing the average level over time.

**3.1.27 Loudness Unit Full Scale (LUFS) [EBU R 128-2023]:** LUFS' is equivalent to 'LKFS' (which is used in ITU-R BS.1770). The EBU uses 'LUFS' which is compliant with international naming conventions.

**3.1.28 material hearing impairment [b-NIOSH]:** An average of the hearing threshold levels for both ears that exceeds 25 dBHL at 1000, 2000, 3000 and 4000 Hz.

**3.1.29 microphone-in-real-ear [ISO 11904-1]:** Refers to measurements carried out using miniature or probe microphones inserted in the ears of human subjects.

**3.1.30 momentary exposure level [IEC 62368-1]:** Metric for estimating 1s sound exposure level from the HD 483-1 S2 test signal applied to both channels, based on [EN 50332-1], clause 4.2.

NOTE 1 – MEL is measured in dB.

NOTE 2 – See B.3 of [EN 50332-3] for additional information.

**3.1.31 ordinary person [IEC 62368-1]:** Ordinary person is the term applied to all persons other than instructed persons and skilled persons. Ordinary persons include not only users of the equipment, but also all persons who may have access to the equipment or who may be in the vicinity of the equipment. Under normal operating conditions or abnormal operating conditions, ordinary persons should not be exposed to parts comprising energy sources capable of causing pain or injury. Under a single fault condition, ordinary persons should not be exposed to parts comprising energy sources capable of causing injury.

**3.1.32 personal music/media player [IEC 62368-1]:** A personal music player is a portable equipment intended for use by an ordinary person, that:

* Is designed to allow the user to listen to audio or audio-visual content / material; and
* Uses a listening device, such as headphones or earphones that can be worn in or on or around the ears; and
* Has a player that can be body worn (of a size suitable to be carried in a clothing pocket) and is intended for the user to walk around while in continuous use (for example, on a street, in a subway, at an airport, etc.).

NOTE – Examples are portable CD players, MP3 audio players, mobile phones with MP3 type features, PDAs or similar equipment.

**3.1.33 personal audio device []:** A portable device designed to be worn on the body or fit in the clothing pocket to listen to various forms of media. It can be connected to a listening device. An example of a personal audio device is a personal media player (PMP).

**3.1.34 personal audio system (PAS) []:** A system of a personal audio device and a listening device. Examples are a personal media player (PMP) connected to headphones, and headphones capable of playing locally stored content independently of an external PAD.

**3.1.35 skilled person [IEC 62368-1]:** Skilled person is a term applied to persons who have training or experience in the equipment technology, particularly in knowing the various energies and energy magnitudes used in the equipment. Skilled persons are expected to use their training and experience to recognize energy sources capable of causing pain or injury and to take action for protection from injury from those energies. Skilled persons should also be protected against unintentional contact or exposure to energy sources capable of causing injury.

**3.1.36 sound allowance []:** A dose estimate of sound exposure over a certain rolling period of time (e.g., daily or weekly), commonly expressed as a percentage of the maximum regarded as safe. A weekly sound allowance is equivalent to 100% calculated sound dose (CSD).

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**3.1.37 sound-induced []:** Refers to a state or a quality resulting from exposure to sound. The sound may be (part of) music or "noise", which implies the sound is not desirable.

**3.1.38 sound-induced permanent threshold shift []:** Synonymous with permanent sound induced hearing loss (SIHL).

**3.1.39 sound-induced temporary threshold shift []:** Sound induced hearing loss (SIHL) that results from exposure to sound but recovers after a sufficient time spent in low sound conditions.

**3.1.40 sound-induced tinnitus []:** Perception of phantom sound in the ears or head that are either temporary or permanent, following excessive sound exposure.

**3.1.41 sound pressure level [b-ITU-R V.574]:** The logarithm, generally expressed in decibels (dB SPL), of the ratio of sound pressure and a reference pressure *p*0, often 20 μPa. Note that a factor of 20 is used when the ratio is between two sound pressures, rather than between two sound intensities.

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**3.1.42 stapedius muscle reflex []:** The process in which the stapedius and tensor tympani muscles of the ossicles contract when the ear is exposed to high intensity sound. This is also called auditory reflex.

**3.1.43 transducer []:** An electronic device that converts energy from one form to another.

## Terms defined in this Recommendation

This Recommendation defines the following terms.

**3.2.1 Dynamic range compression:** refers to a signal processing technique that will reduce the loudest peaks of an audio signal whilst increasing the lower sounds, thus altering the dynamic of a sound signal (the difference between loudest and software sounds in a given audio range). This particular signal processing strategy can result in increased audibility of the entire dynamic range of a game's sound track at lower levels, hence it being also known as "night mode", as it can allow for the consumption of video games late at night at lower volumes.

**3.2.2 esport:** Competitive and organized computer and video gaming, in which two or more parties (individuals or teams) face each other under regulated and balanced conditions.

**3.2.3 esport live event:** An esport live event (ELE) can be defined as an event designed for live and interactive entertainment centred around competitive esports, typically involving video game tournaments and related content. These events are conducted in a live format, often in designated venues, where esports enthusiasts gather to witness the gameplay, competition, and associated entertainment. The primary focus of ELEs is the hosting of video game tournaments, where professional players or teams compete against each other in various video game titles, and during competitive gameplay ELEs may feature sound reinforcement audio systems, multimedia displays (such as large screens) and stages to showcase the gameplay, commentary, and highlights to the audience.

**3.2.4 game player:** a person that plays video games on gameplay devices including personal computers, mobile devices, video game consoles, laptops. For the purpose of this standard, the most important consideration is the expected exposure a game player is expected to experience, and as such game players are further categorized into subgroups: casual, regular and esports game players.

**3.2.4a casual game player:** a person who plays video games for leisure and entertainment purposes as opposed to competition. Casual gamers will play less frequently and may consume games on devices without sound at all (for e.g., mobile video game apps).

**3.2.4b regular game player:** a video game player who plays video games as a regular source of entertainment. This type of game players will typically spend longer amounts of time participating in video gameplay, and/or listen to games at higher intensities.

**3.2.4c Esports game player:** a video game players that participate in structured esports leagues, circuits, tournaments or similar, as individuals or as part of a team. These game players can be professional or amateur level and typically have a significantly higher exposure to video game play due to competition and training regimes.

**3.2.5 video game audience participant:** someone who observes the video game play of others, but is not playing the game. Video game audience participants can include (but are not limited to) spectators viewing video game events being streamed via an online broadcasting service (live or pre-recorded) or spectators viewing live esports events at venues.

**3.2.6 media:** Audio or audio-visual content for the purposes of entertainment.

**3.2.7 multi-purpose gameplay device:** refers to a device that is designed for a range of functions but is also capable of executing video game software and applications. A multi-purpose gameplay device can be stationary (for e.g., a desktop computer), or portable (for e.g., a tablet). In the context of this safe listening standard, examples of multi-purpose devices include personal computers, mobile devices, game playing laptops/desktops and virtual reality and augmented reality devices.

**3.2.7a personal computers (PCs):** General-purpose computers that are equipped with specialized components such as graphics cards, processors, and memory to deliver high-quality video gameplay experiences.

**3.2.7b mobile devices:** Smartphones and tablets with capabilities to run and play video games, often available through app stores.

**3.2.7c game playing laptops/desktops:** Personal computers optimized for game playing, featuring powerful processors, graphics cards, and advanced cooling systems.

**3.2.7d virtual reality (VR) and augmented reality (AR) devices:** Hardware systems that enable users to experience games in immersive virtual or augmented environments.

**3.2.8 non-essential game audio:** includes sound effects, music, or dialogue that contribute to the overall atmosphere, immersion, or aesthetic appeal of the game but are not integral to the functional aspects of gameplay. While these audio elements enhance the sensory experience and enrich the game's ambiance, they can often be adjusted, muted, or reduced without directly affecting a player's ability to interact with the game world or achieve in-game goals.

**3.2.9 safe listening gameplay device:** a video gameplay device designed to include features and functionalities that prioritize the well-being of the user's auditory health during gameplay. The primary objective of a safe listening gameplay device is to promote responsible and healthy video gameplay practices by safeguarding users from excessive sound levels that could lead to hearing impairment, tinnitus and/or discomfort.

**3.2.10 speaker:** a device for converting electrical energy into acoustical signal energy that is radiated into a room or open air. It includes transducers that are in-built into the video gameplay hardware or are external to these e.g., loudspeakers, sound bars, sound reinforcement speakers or in-ear-monitors.

**3.2.11 video game:** an electronic game that involves interaction with a user interface or input device (such as a joystick, controller, keyboard, or motion sensing device) to generate visual feedback for a player. Video games encompass a wide variety of genres and formats, ranging from simple arcade games to complex, immersive simulations. They can be played on various platforms, including personal computers, video game consoles, handheld devices, and mobile phones.

**3.2.12 video gameplay device (VGD):** a device designed for executing the software instructions that constitute a video game. It comprises a combination of hardware, firmware and an operating system that are specifically designed and manufactured to facilitate the playing, processing, rendering and production of immersive video and audio gameplay content. A video gameplay device can be designed to be stationary, such as a video game console, or portable. In the context of this safe listening standard, examples of video gameplay devices include game and handheld (or portable) consoles.

**3.2.12a game console:** a dedicated game playing system designed to connect to televisions or monitors, providing a platform to run video games.

**3.2.12b handheld or portable console:** a portable gaming system designed for on-the-go video gameplay.

NOTE – For a definition of a personal computer and/or mobile gameplay device, see multipurpose gameplay device (clause 3.2.6).

**3.2.13 video gameplay peripheral:** an additional video game hardware connected to a video gameplay device that provides some sort of additional functionality relevant to a particular video game being executed. Whilst peripherals can provide a range of functions, peripherals most relevant to this standard are peripheral devices capable of reproducing or capturing audio, such as:

**(a) Ear level audio devices:** such as headphones, earphones, ear buds, in ear monitors (IEMs); wireless and non-wired, which often feature both sound producing components (for e.g., drivers, speakers, etc) as well as sound capturing components (for e.g., microphones).

**(b) Free-field audio devices:** such as speakers, soundbars and sound systems

**(c) Input accessories:** Various hardware accessories like keyboards, joysticks, steering wheels, gamepads and motion-sensing devices that enhance gameplay for specific genres and may include onboard microphone systems.

# Abbreviations and acronyms

TBD

# Conventions

TBD

# Background

## Safe listening introduction

Temporary and permanent hearing threshold shifts from exposure to sound and noise is an increasing public health problem, particularly in children and adolescents. In fact, sound-induced hearing loss (SIHL) is the leading cause of preventable hearing loss in the world. From the early 1990s to 2000, it was estimated that the number of young people with SIHL has increased from 6.7% to 18.8%. Some of this can be attributed to the fact that in this day and age, young people are utilizing their leisure time with activities that expose them to high levels of music using personal audio systems (PAS) or attending communal events such as concerts, bars, clubs, etc. Despite this emerging epidemic, there are currently almost no standards set to limit sound exposure in non-occupational settings, especially for PAS. This Recommendation addresses this standardization gap.

It may be considered that prevention of hearing loss through safe listening practices is the responsibility of the individual. However, the onus of raising awareness and creating an environment for safe listening lies with the community, manufacturers of devices, governments and other stakeholders.

Hearing loss can occur as a consequence of listening to high levels of sound over prolonged periods of time. The unsafe use of video gameplay devices (VGDs) poses a threat to the hearing of millions.

Such hearing loss is permanent, but it can largely be prevented through safe listening practices. Appropriate technology can help to reduce the risk of unsafe listening. A personal audio device/system in compliance with standards which serve to minimize the users' risk of acquiring hearing loss, (as a consequence of its use) can possibly be termed as a safe listening device/system.

The term safe listening refers to listening behaviour that does not put peoples' hearing at risk. A person's risk of losing his/her hearing depends on how loud, for how long and how often the person is exposed to loud sounds. Such exposure may be through personal audio devices or in entertainment venues as well as in the surrounding environment, such as in traffic, in the workplace or at home.

The term sound allowance refers to the acceptable level of sound energy an individual can receive without putting his/her hearing at risk. The term "weekly sound allowance" is equivalent in meaning to "100% calculated sound dose (CSD)" (see clause 3.1.3). It is recommended to use the term 'sound allowance' for health communication purposes, rather than 'dose'. It should be also noted that the sound allowance determined as described by this Recommendation ignores sound exposure from sources other than personal audio devices. Depending on what those exposures are, a risk of hearing loss may still exist for an individual.

Use-cases for consideration when applying this Recommendation can be found in [b-FSTP-SLD-UC].

## Video gameplay device

The definition for personal video gameplay device (VGD) is given in clause 3.2.31, and Figure 6-1 illustrates the general architecture of a VGD.



Placeholder image – To be redrawn with a VGD block diagram

Figure 6-1 – Architecture of a video gameplay device (VGD)

In this diagram, "source" can be either stored locally on the device or accessed remotely, for instance, via online platforms or streaming services.

A VGD is intended for use by an individual or individuals and

* is designed to enable the user to engage with video gameplay content; and
* utilizes a display screen for visual presentation; and
* incorporates video gameplay peripherals such as controllers, keyboards, or motion-sensitive devices for interactive input; and
* features an audio component for delivering sound effects and immersive audio experiences; and
* can be carried or placed in close proximity to the user during operation (for example, played within proximity to television/computer screen, held in hands, placed on a surface); and
* provides adjustable settings for visual and auditory output.

Examples of VGDs include video game consoles, personal computers (PCs), handheld gameplay devices, and mobile devices with gameplay capabilities; wearable gaming accessories with integrated displays and interaction mechanisms; devices equipped with virtual reality (VR) or augmented reality (AR) functionalities.

The provisions outlined do not apply to:

* hearing aid equipment and other devices for assistive listening;
* outdated analogue video gameplay devices, such as antique arcade cabinets;

NOTE – This exemption has been allowed due to evolving technologies and usage patterns. The listed exemptions are subject to reassessment as technology progresses.

Communication-focused devices are beyond the scope of this Recommendation.

While the current scope emphasizes gameplay and visual content, considerations for virtual reality and immersive experiences are earmarked for future analysis.

## Video gameplay software (titles)

Video gameplay software, in the context of digital entertainment, refers to computer programs and applications specifically crafted to facilitate interactive engagement with video gameplay content. This software is intricately designed to enhance user experiences through interactive elements, and is typically designed to include both visual and audio content to create a sense of immersion. Key features of gameplay software include:

* Interactive engagement: Gameplay software enables users to actively participate in video gaming experiences by providing a platform for user input and interaction. This can involve controlling characters, making decisions, and influencing the virtual environment.
* Visual presentation: Utilizing display screens for visual presentation, gameplay software delivers graphics and dynamic visuals that contribute to the immersive nature of video games.
* User input devices: Gameplay software is compatible with various video gameplay peripherals, including controllers, keyboards, and motion-sensitive devices. These peripherals serve as interfaces, allowing users to control and navigate the virtual world created by the software.
* Audio component: To enrich the gaming experience, gameplay software incorporates audio components that deliver sound effects, music, and other auditory cues. This audio component (also referred to as the soundtrack) is typically designed to be reproduced by speakers or ear level transducers such as headphones, earphones or in-ear monitors.
* Adjustable settings: Providing users with adjustable settings for visual and auditory output, gameplay software allows individuals to customize their gaming experience based on personal preferences. This adaptability enhances accessibility and accommodates diverse user preferences.

Examples of platforms hosting gameplay software include video game consoles, personal computers (PCs), handheld gameplay devices, and mobile devices with gaming capabilities. Additionally, gameplay software can extend to wearable gaming accessories featuring integrated displays and interaction mechanisms, as well as devices equipped with virtual reality (VR) or augmented reality (AR) functionalities.

The provisions outlined do not apply to:

* Gameplay software specifically developed for the purpose of auditory diagnosis or rehabilitation.
* Gameplay software designed with no soundtrack at all.

## Esports live event

An Esports live event (ELE) is organized for the purpose of hosting competitive esports matches and engaging a live audience. It involves:

* the assembly of professional esports players and teams to compete in a tournament or match; and
* the utilization of video game consoles, PCs, or other gameplay systems as the primary platform for gameplay; and
* the incorporation of a stage and visual display to present the ongoing gameplay and related content to the live audience; and
* the implementation of an audio system that delivers in-game sound effects, commentator commentary, crowd reactions, and event-related announcements; and
* the provision of seating or standing areas for the live audience to spectate the matches in person; and
* arrangements to stream the event online for remote viewers.

Examples of ELEs encompass international esports tournaments, local competitive events, and exhibition matches that bring together professional and amateur players for high-stakes competition. ELEs showcase a range of esports genres, including multiplayer online battle arena (MOBA), first-person shooter (FPS), real-time strategy (RTS), and more.

These provisions do not apply to:

* recreational video gameplay sessions or casual gatherings;
* non-competitive video gameplay events without professional or amateur players conducted in an unstructured way;
* competitive esport events without live in-person component, e.g. streamed online only.

NOTE 1 – This exemption recognizes the distinct nature of esports events and their focus on competitive gameplay. Non-competitive video gameplay events are subject to different considerations.

* The future exploration of video gameplay and virtual reality integration within the esports live event setting is anticipated for subsequent study.

NOTE 2 – The recommendations made in this guideline apply to the hardware and software used during esports. The external sound in the esports venue (other than that heard through the video gameplay HW and SW) is outside the scope of this guideline. Features of a safe listening entertainment venue are covered in a separate technical paper.

# Damage risk criteria

## Operational modes for video gameplay devices (VGD)

It is required that VGD, paired with a personal audio accessory (such as a headphone) shall include a system that tracks the user's exposure time, and estimates sound level and usage of a reference exposure (sound allowance). This includes all media playback through the device or system (i.e., stored locally or streamed) during times when the user is using ear/headphones.

This system shall determine the exposure of the user based on the following mode:

* Mode 1: (WHO) standard level for adults: this will apply 1.6 Pa2h per 7 days as the reference exposure.

NOTE 1 – The value is adapted from [IEC 62368-1] and is based on the values mentioned in [b-2009/490/EC], which stipulated that sound is safe when below 80 dB(A) for a maximum of 40 hours per week. Therefore, the value of 100% calculated sound dose (CSD) corresponds to 80 dB(A) for 40 hours.

The VGD should offer a more conservative mode to users that prefer or benefit from a more conservative level as outlined in mode 2:

* Mode 2: (WHO) standard level for users that prefer or may benefit from lower sound levels (e.g., for children): this will apply 0.51 Pa2h per 7 days as the reference exposure.

The device or system should allow the users to select their reference exposure as one of the above-mentioned two modes.

NOTE 2 – Reference exposures are derived from 80 dB A (Mode1) and 75 dB A (Mode 2) SPL for 40 hours per week (which in turn is derived from 8 hours per day, 5 days/week).

NOTE 3 – An alternative to expressing exposure in terms of % used, is to express the *time left* until reaching a certain exposure (e.g., remaining playback time at the current playback level until reaching 100%).

It is recommended that mode choice be given when using the player for the first time (or when the device is reset to factory settings). It is recommended that the user be able to change the mode choice at any later time, e.g., via a device configuration menu.

Examples of weekly listening time duration based on sound allowance for the modes above can be found in Table 1 and Table 2.

Table 1 – Example of weekly listening time for Mode 1

| dB(A) SPL | Weekly (1.6 Pa2h) |
| --- | --- |
| 107 | 4.5 min |
| 104 | 9.5 min |
| 101 | 19 min |
| 98 | 37.5 min |
| 95 | 75 min |
| 92 | 2.5 h |
| 89 | 5 h |
| 86 | 10 h |
| 83 | 20 h |
| 80 | 40 h |

Table 2 – Example of weekly listening time for Mode 2

| dB(A) SPL | Weekly (0.51 Pa2h) |
| --- | --- |
| 107 | 1.5 min |
| 104 | 3 min |
| 101 | 6 min |
| 98 | 12 min |
| 95 | 24 min |
| 92 | 48 min |
| 89 | 1 h 36 min |
| 86 | 3 h 15 min |
| 83 | 6 h 24 min |
| 80 | 12 h 30 min |
| 77 | 25 h |
| 75 | 40 h |

# Safe listening features for gameplay hardware (video gameplay devices and multi-purpose gameplay devices)

Gameplay hardware includes, but is not limited to, video game consoles, personal computers, video gameplay laptops, handheld gameplay devices, mobile devices, virtual reality, augmented reality devices, and includes the operating systems which may be installed upon these devices for it operate.

Among the various components integral to the video game experience, video gameplay hardware stands out as a pivotal factor that can directly influence the resulting sound pressure level experienced by gamers. This influence becomes particularly pronounced in scenarios where the entire video gameplay setup is sourced from a single vendor or manufacturer, where all operating equipment values will be known, and calculated sound dosage can be more accurately recorded.

## Dosimetry

A gameplay hardware device **shall track the level and duration of the user's exposure to sound as a percentage used of a reference exposure**, also known as a user's "sound allowance".

The user shall have the option to choose one of two modes that determine the total sound dose he or she can safely consume:

* Mode 1 for adults: 80 dB (A-weighted) for 40 hours per week.
* Mode 2 for children: 75 dB (A-weighted) for 40 hours per week

Where possible, the calculation should be calculated across multiple devices used by the same individual, for example, personal audio systems, video gameplay devices and others. It is ideal to provide a single estimate to the individual. It should also be able to calculate sound dosage for both ear level audio devices (headphones, earphones, in-ear monitors etc.) and free field audio devices (speakers, surround sound arrays etc).

See Appendix I for information on implementation of dosimetry.

## Dosimetry user interface

A gameplay hardware device shall provide dosimetry information to the user in a clear, easily accessible and user-friendly user interface.

User interface features shall include, at the minimum:

* Rolling 7-day recorded information on sound allowance use.
* A suitable indication of whether activity is "Safe/OK" or "Unsafe/Not OK". Where possible, this calculation should be calculated across multiple devices used by the same individual. Where such harmonization isn't possible, users must be informed that listening over multiple devices can reduce the accuracy of the estimate presented and that the user should exercise caution and keep volumes low.
* Information on how to listen safely.
* Information on safe listening features available in the VGD.

Examples are shown in clause I.2.

### Notifications

The video gameplay device shall provide notifications about sound allowance use, such as time spent, sound allowance consumption and/or prediction of when sound allowance will be exceeded. These can be delivered at appropriate times that do not break video gameplay immersion. Notification could be provided:

1. upon the initial boot of the VGD prior to a game title being loaded.
2. upon the end of a video gameplay session at the exit screen.
3. using real-time notification by using in game notification systems.
4. Should in game notification systems be the selected method of safe listening notifications for the gameplay hardware device, provisions need to be made to ensure safe listening notifications should still occur even if the user enables "do not disturb" modes.

Upon display of appropriate sound allowance information indicating unsafe listening, the user will be provided a cue for action with two options:

1. Accept the risk of hearing damage by continuing to listen at current levels
2. Protect their hearing by activating a safer listening mode, the lowers the volume of the VGD to a safer level.

See clause I.2 for examples of this type of notification.

## Volume control system

A VGD **shall provide an easily accessible and configurable volume control system** (which is in accordance with the selected operational mode) to mitigate the risk of permanent hearing damage for gamers and participants by setting the default volume levels to a safe listening level.

Note: In the context of video game audio, "volume control" refers to the mechanism by which players and users can adjust the intensity or loudness of sound output generated by a video game. A volume control system can work manually, with input from the gamer, or can be part of an automatic volume control system, which is controlled by the VGD.

The game **shall also provide a disclaimer** for the benefit of the gamer when checking the game audio level. *For example:*

*"Default game volume is set at levels that have been tested to be safe on typical audio equipment and for average game play of 8 hours per week. For the most accurate safe listening experience, we recommend using a headphone with safe listening features".*

## Automatic volume reduction for unsafe listening behaviour

As per clause 8.2, the user will be provided with a visual based warning when unsafe listening is detected. The warning shall be followed by a "cue for action" in which the user is offered the choice to either accept the risk of continued listening or protect their hearing.

The volume will be automatically reduced to a safe level (80 dB for Mode 1, 75 dB for Mode 2) when:

1. User fails to acknowledge the notification presented in clause 8.2
2. User has reached the maximum sound allowance for the week depending on mode selected, and the user has selected the option to "protect their hearing" when prompted.

The user should be informed that the volume is being reduced by notification.

## Audio device compensation/headphone safety mode

Video gameplay hardware **shall provide a default headphone safety mode**.

"Headphone safety mode" refers to a feature wherewhen headphones are detected (or set by the gamer in the game audio menu) a reduction of volume shall occur. This is important since aset of headphones is placed closer to the ear of a gamer than a set of loudspeakers, and in the case of a child, the intensity levels may be unknown to a parent or caregiver.

# Safe listening features for video gameplay software

Safe listening feature compliance can be achieved by a video game software title, separate to that of the video gameplay device or multi-purpose gameplay device it may be designed to run on.

## Safe listening warnings/notifications

Video games **shall routinely provide in-game warnings or notifications to gamers regarding** auditory risks (e.g., hearing loss, tinnitus) associated with video gameplay activities.

These warnings or notifications shall be provided within the game play experience. These include, at the minimum:

### Initial load screen

On the first initial loading of the game and prior to the first gameplay occurrence, a warning shall be displayed notifying the gamer that video games can be a source of unsafe listening, and also include a description of safe sound level dosage and examples of auditory symptoms to be aware of should hearing be put at risk (e.g. ringing in the ears, fullness in the ear, loss of sensitivity to other sounds etc). [See Appendix II for examples.]

This "Initial load screen" warning shall display for a reasonable amount of time to allow the gamer sufficient time to read the displayed content, at which time a dismiss option becomes available, for e.g. "I have seen this message".

Should parental controls be active and detectable by the game title, this feature should only be permanently dismissible by a user with parental control access.

### After a period of continuous gameplay

During a convenient in-game break (for e.g., at the end of a round of gameplay, after completing a level, after losing a life, when pausing game, etc.) a notification shall be displayed indicating that the gamer's ears have been exposed to two hours of sound dosage.

### At the end of game play, as the gamer exits the game

A final notification shall be displayed, prompting the gamer to check their hearing with simple messaging – for e.g., are your ears ringing? Have you lost any hearing sensitivity during their recent session? Has anyone in your household mentioned that their volume was too loud? Take time to check your hearing once in a while? *Appendix IV provides examples of some simple messages that can be displayed*.

This "End of game play" warning shall display for a reasonable amount of time to allow the gamer sufficient time to read the displayed content, at which time a dismiss option becomes available, for e.g. "I have seen this message".

Should parental controls be active and detectable by the game title, this feature should only be permanently dismissible by a user with parental control access.

## Volume channel controls

The video game software **shall include independent channel controls** under the game audio menu options, allowing the game player to adjust levels of different sounds within the game, such as:

* Master game volume level
* Game dialogue level
* Loud sound effect levels
* Soft sound effect levels
* In-game music
* Voice chat
* Non-essential game audio volume (if applicable)

Volume channel controls of this nature can provide game players an efficient way to reduce either:

1. specific sounds that they consider to be non-essential to their game experience, and/or
2. the overall master volume level within the game

In one or both scenarios, sound exposure is reduced.

Volume channel controls should be easily and readily available to the individual, so that adjustments for comfort are quick to perform.

## Safe/Safer listening mode

The video game shall offer **a specific default audio setting, referred to as 'Safe listening mode' or 'Safer listening mode'** which is aimed at reducing the total sound dosage a user will receive during a gameplay session whilst minimally affecting the gameplay experience. This mode includes several features activated together, simplifying the decision-making requirement for a gamer and designed to allow enjoyable video gameplay, with lower levels of sound exposure.

The particular combination of sub-features activated by 'Safer listening mode' shall change based on the average loudness of the mastered game audio mix (LUFS over a 30 minute window, using the loudest part of the sound track) and activation of these features are intended to increase the amount of time a gamer can play the same safely.

The final mastered LUFS value shall be embedded and visible within the sound menu of the game's menu system.

### Games mastered with high LUFS (-X LUFS and above)

Where the average level of a mastered game audio soundtrack is measured at -X LUFS or above over 30 a period of minutes, the game is considered to be a "loud" volume game. The minimum set of features that shall automatically activate as part of a 'Safer listening mode' preset include:

* An initial dynamic range test, which determines the gamer's upper volume comfort   
  level, where sounds are comfortably loud and lower threshold, where sounds are soft but   
  easily audible. This information is to be used to calibrate dynamic range compression.
* The gamer is asked if they have troublesome tinnitus (ringing or buzzing in their ears that is made worse by certain in-game audio sounds). If yes, tinnitus sounds are disabled.
* Volume master volume is set to 60% of available volume level.
* Dynamic range compression, which lowers impulse sounds and increases essential in game soft sounds is enabled. Dynamic range compression should aim to lower the intensity of loud impulse sounds by X dB.
* The game software **shall include automated attenuation of non-essential game audio components** of a video game (for e.g., audio between rounds of a first-person shooter).
* In-game captions are enabled, encouraging lower levels of safe listening.

### Games mastered within standard LUFS (-23 LUFS +/- 6 LUFS)

Where the average level of a mastered game audio soundtrack is measured at -X LUFS (+/-6 LUFS) over 30 a period of minutes, the game is considered to be a "medium" volume game. The minimum set of features that shall automatically activate as part of a 'Safer listening mode' preset comprises:

* Dynamic range compression, which lowers impulse sounds and increases essential in game soft sounds is enabled.
* The gamer is asked if they have troublesome tinnitus. If yes, tinnitus sounds are disabled.
* Volume control is set to 60% of available volume level.
* In-game captions are enabled, encouraging lower levels of safe listening.

### Games mastered with low levels of LUFS (-X LUFS or below)

Where the average level of a mastered game audio soundtrack is measured at -X LUFS or softer over 30 a period of minutes, the game is considered to be a "soft" volume game. The minimum set of features that should automatically activate as part of a 'Safer listening mode' preset comprises:

* The gamer is asked if they have troublesome tinnitus. If yes, tinnitus sounds are disabled.
* In-game captions are enabled, encouraging lower levels of safe listening.

See Appendix III for more information regarding LUFS.

## Audio device compensation/headphone safety mode

Game software **shall provide a default headphone safety mode**.

"Headphone safety mode" refers to a feature wherewhen headphones are detected (or set by the gamer in the game audio menu) an automatic reduction of volume shall occur.

This purpose of this feature is to compensate for a closer location of the sound source to the game player's auditory system, and to offer protection to volume sensitive populations, as parents or caregivers may have less awareness of volume due to the sound dampening provided by external headphone components.

This feature is not required should the video gameplay hardware or multi-purpose gameplay device that the video gameplay software title is released on provides an equivalent feature.

## Option to remove "Tinnitus sounds"

Video game title software **shall include an option to remove sounds that trigger tinnitus** via the sound menu when starting the game each time.

Tinnitus-inducing sounds are usually related to "flashbang" sound effects, or simulations of tinnitus such as when a player is overwhelmed by an enemy during a fight or cut-scene. The option shall be given to the player when starting the game each time. Once selected, it shall be maintained in this mode unless the player opts to change in the setting in the audio menu of the game.

# Textual based health warnings

## User guides and other written information

Video gameplay devices shall provide sufficient text-based information to gamers in user guides or related electronic resources and websites.

This information should go beyond a minimum set of instructions and aim to change behaviour. It should include:

* a simple statement confirming that video gameplay and esports activities can be a source of unsafe listening due to potential volume levels and duration of gameplay.
* a list of common auditory symptoms that can occur when unsafe listening has occurred, including tinnitus and loss of hearing sensitivity.
* simple instructions to incorporate safe listening into gameplay, including references to more information as well as any onboard features they can use.

Such information should avoid technical or complex terminology, or references that are not easy to understand for a lay person.

Appendix IV gives some examples of appropriate and insufficient warnings.

## Safe listening feature information

To ensure the effective use of safe listening features and the safe/safer listening mode, video gameplay or software titles shall include information pertaining to the purpose and rationale of safe listening features available within their systems. *See IV.4 and IV.5 for examples.*

# WHO-ITU headphone output sensitivity value register

Video gameplay audio accessories should provide WHO-ITU access to all necessary technical specification information in order for game hardware to provide accurate dosimetry.

NOTE – One substantial hurdle to accurate dosimetry is the sharing of output sensitivity values of audio accessories to video gameplay hardware devices.

# Features for live esport events

The *"Global Standard for Safe Listening in Live Venues and Events*" established by the World Health Organization (WHO) presents a systematic and comprehensive approach to achieving safe listening practices within live events and venues. This standard methodically balances the imperative of ensuring auditory safety with the desire to preserve the entertainment value inherent in live performances. This framework serves as the foundation upon which the subsequent recommendations for volume control in esports live events are built.

Notably, the WHO's standard lacks specific provisions concerning the management of sound exposure for on-stage performers, which presents a noteworthy gap in its coverage. The present document aims to address this gap by offering guidance on how to extend safe listening principles to include on-stage performers during esports live events. This extension ensures a holistic approach to auditory well-being, encompassing not only the audience but also the individuals contributing to the event's audiovisual experience.

Features for safe listening at live esport events can utilize the features within this global standard with amendments made to broaden protections to esport competitors, and cater for the unique aspects of esports live events:

* Live sound reinforcement systems for the purpose of amplifying game audio, player and commentator dialogue, and associated performance sounds *for audience participants.*
* Esport competitor audio systems (most commonly headphones, earphones etc).
* Broadcast systems for the purpose of streaming to online *audience participants.*

## Sound level limit

An upper limit of 100 dB LAeq, 15 min shall be imposed on stage, keeping sound safe and enjoyable for the audience.

## Sound level monitoring

Live monitoring of sound levels shall be performed by a designated staff member using calibrated equipment.

## Venue acoustics and sound systems

Sound system and venue acoustics shall be optimized ensuring safe listening and improved sound quality.

## Personal hearing protection

Hearing protection, such as earplugs, along with appropriate instructions **shall be available** to audience members.

Only headphones compliant with clause 10.2 (acoustic damping) will be provided for competitors during their events.

## Quiet zones

**Esports live events shall include quiet rooms** for competitors and audience members. In addition, adequate breaks shall be taken between the competitive rounds when sound levels shall be kept below 80 dBA, in order to provide a break from sound exposure.

## Appropriate training and information

Esports players, audience members and venue staff shall be provided information to make them aware of practical steps they can take to ensure safe listening.

# Guidance on ancillary concerns

To be provided

Appendix I  
Information on implementing dosimetry

## I.1 Dosimetry methodology

A dose in the context of acoustic dosimetry is calculated as follows:

A black background with letters

Description automatically generated

Where 𝑝𝐴 is the A-weighted and diffuse-field corrected sound pressure.

As per H.870, dosimetry shall follow the following calculated sound dosage limits accordingly for both modes.

Table I.1 – Examples of weekly listening time for Modes 1 and 2

A screenshot of a graph

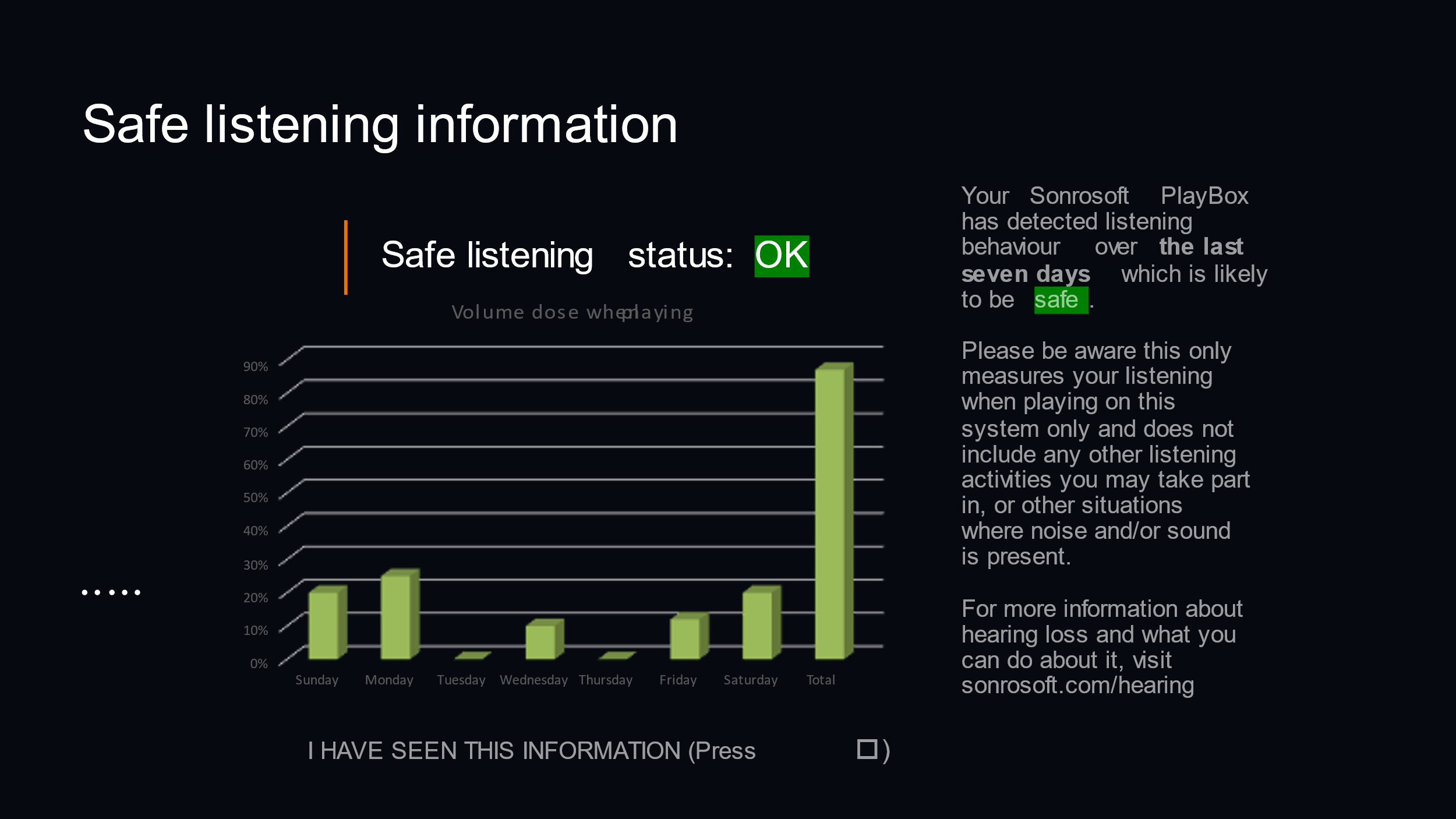
Description automatically generated

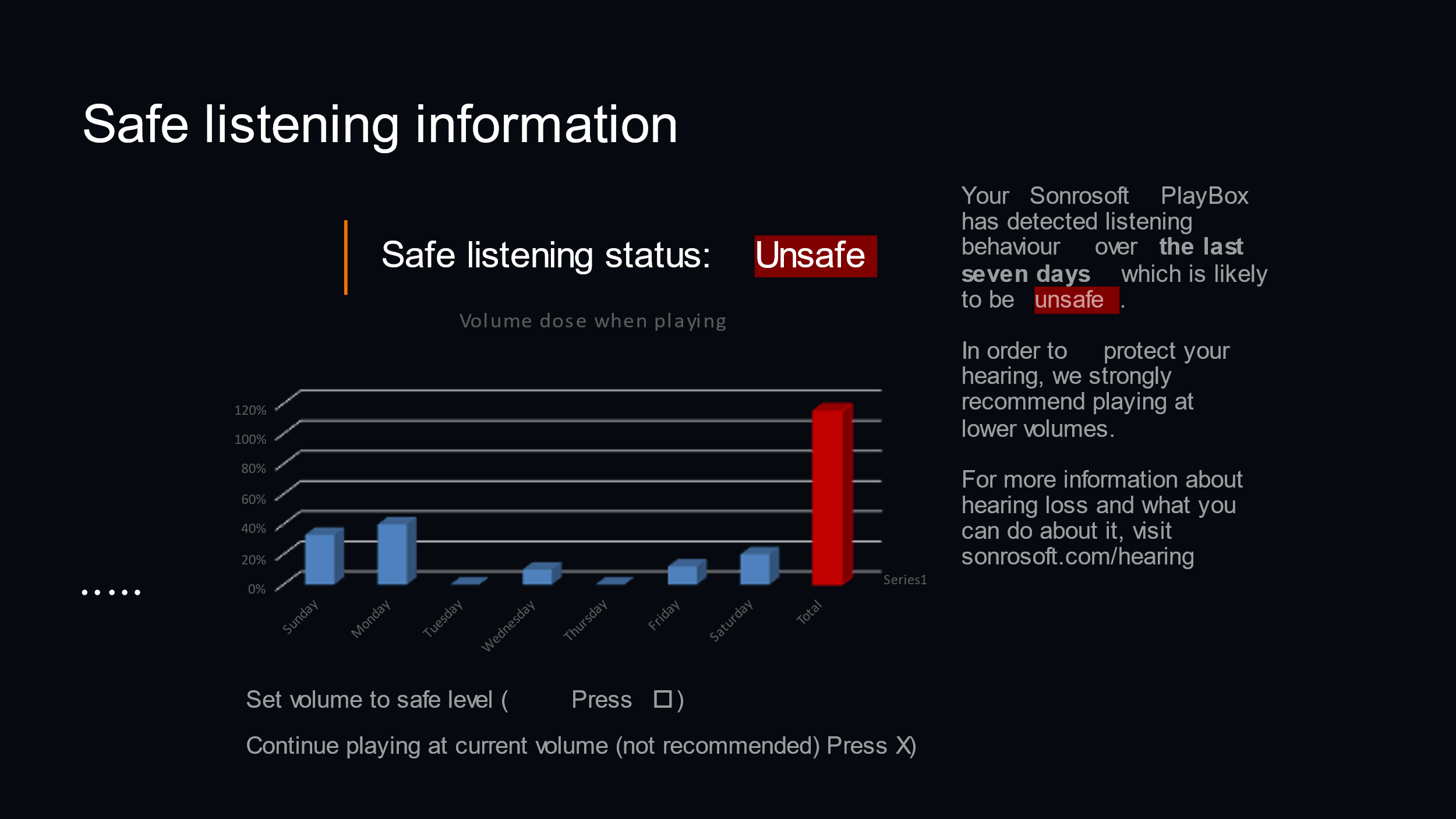
If appropriate video gameplay hardware and accessories are available and dosimetry can be recorded by the video gameplay hardware device, a compliant device shall provide the user a suitable method for volume-limiting. This refers to a feature which provides a message relative to a predetermined reference exposure (sound allowance) limit and when this message is unacknowledged, the device or system shall automatically reduce the volume of the device to achieve a sound level at the DRP, with diffuse-field correction, no greater than 80 or 75 dBA (according to the mode selected). It is further recommended that this should be set as the default option and that the user should have the option of turning this feature off if they do not wish to use this setting.

When this is implemented, a volume limiting option message shall be automatically provided when the user reaches 100% of the weekly allowance. The user shall be given a message, which will allow them the option to "continue listening" in case they do not wish the device volume to reduce. When the message is not acknowledged, the default action will be to reduce the volume to achieve the predetermined sound level. If possible, the users should be given the option to customize this level (the level at which they would like their device to limit the volume) according to their preference.

A video gameplay hardware system can also provide earlier warnings, for example at 80% calculated sound dosage (CSD), so that the gamer can change behaviours before reaching 100% CSD, or consider what other listening activities they have participated in that week to gauge whether they may already be at their weekly limit.

As indicated earlier in 11.1.2, warnings shall be presented to the game player upon exist of the video gameplay session, and not during the video gameplay session.

  
(a) Dosimetry information: Safe/OK status when voluntarily accessed from a sound menu

  
(b) Dosimetry information: Unsafe/Not OK status when voluntarily accessed from a sound menu

A screenshot of a warning message

Description automatically generated  
(c) Warning notification shown during upon exist of the game.

Figure I.1 – Dosimetry: Examples of safe listening notifications

Appendix II  
Example of safe listening warnings

## II.1 Safe listening warnings: Example of a safe listening warning upon initial load of a video gameplay software title

Example: Compliant game software titles shall include a warning, during the first load of the game. This warning should include the following information:

* A warning to the gamer of potential risk to hearing.
* Provide examples of potential symptoms to be aware of that indicates unsafe listening is occurring.
* Provide information on the default safe listening settings in the game
* Include links to find further information and guidance.

Ideally, this information should be shown alongside configurable safe listening features.

A screen shot of a computer error

Description automatically generated

Figure II.1 – Video game load screen

Appendix III  
Loudness K-weighted relative to full scale (LKFS) & loudness units relative to full scale (LUFS)

*[Editor's note: Add description of LUFS and LKFS.]*

**Loudness K-weighted Full Scale (LKFS) LKFS** is a standard loudness measurement unit for audio normalization in broadcast systems and other video and music streaming services. Itsignifies Loudness, K-weighted, relative to nominal full scale. The LKFS unit is equivalent to a decibel in that an increase in the level of a signal by 1 dB will cause the loudness reading to increase by 1 LKFS [ITU BS.1770-5].

**Loudness Unit** the unit of measurement used in the process of quantifying a digital recording's perceived loudness by analysing the average level over time.

**Loudness Unit Full Scale (LUFS)** is synonymous with LKFS and was introduced by the European Broadcast Union via [b-EBU R 128] and [b-TECH 3341].

Appendix IV  
Example of textual information provided to the user

## IV.1 Textual information provided through video gameplay hardware

* Provide a simple statement confirming that video gameplay and esports activities can be a source of unsafe listening due to potential volume levels and duration of gameplay.
* Provide a list of common auditory symptoms that can occur when unsafe listening has occurred, including tinnitus and loss of hearing sensitivity.
* Provide simple instructions to incorporate safe listening into gameplay, including references to more information as well as any onboard features they can use.
* Avoid technical or complex terminology, or references that are not easy to understand for a lay person.

Graphical user interface, text

Description automatically generated

Figure IV.1 – Example of an insufficient text-based warning

A picture containing text, screenshot, font, number

Description automatically generated

Figure IV.2 – Example of an overly technical example of a text-based warning

***A screenshot of a computer

Description automatically generated***

**Figure IV.3 – Example of a sufficient text-based warning.**

## IV.2 Example: A rationale for the use of dynamic range compression

Dynamic Range Compression (DRC) in video games is useful for hearing protection, moderating audio extremes and preventing sudden loud sounds from risking players' hearing. Additionally, DRC allows players to enjoy the game's soundtrack at a lower overall volume, enhancing the overall gaming experience while maintaining a balance between realism and well-being. This approach fosters a safer and more inclusive gaming environment for all.

## IV.3 Example of rationale for the use of 60% volume setting

Setting video game audio at 60% volume aligns with the widely recognized 60/60 rule, commonly applied for safe listening on music devices like MP3 players and smartphones. This deliberate choice ensures an optimal balance between immersion and hearing protection.

Bibliography

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[b-TECH 3341] EBU TECH 3341 Supplementary information for R128 (2023), *"EBU Mode" metering to supplement Loudness normalisation*.

TBD

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