

LEISURE NOISE MANAGEMENT IN MONTEVIDEO (URUGUAY): AN EASIER-TO-CONTROL REGULATION

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ABSTRACT

Leisure noise management is a major concern in Montevideo. Although typical conflicts over sound insulation issues are less frequent, new problems have arisen in the last decade; social noise is one of them. It refers to outdoors noise caused by human voices speaking, singing or shouting, music from ‘boom-cars’ and motorcycles, noisy exhausts, horns and other anthropogenic noises. Its proper management falls on the leisure place, since it is due to the presence of those noisy people outside. The 2022 proposal to update the municipal regulations involves a new way of control: a set of acoustic tests and protocolized measurements outside the premises and/or in neighbouring homes will be the basis for defining the closing time of each premises. Thus, municipal inspectors will only have to carry out a control measurement in situ to find out if the premises work correctly or not. All the measurements, the processing of the results and their interpretation are protocolized in detailed instructions of public access, so they will be known by all parties (premises managers, neighbours and authorities). Although municipal management is expected to be greatly facilitated, in some cases it will be unavoidable to carry out measurements inside dwellings.

Keywords: *leisure noise regulations, social noise, leisure noise management*

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1. INTRODUCTION

Uruguay is a small country placed in the South-East of Latin America. It is divided in 19 administrative units (Departments); one of them is Montevideo, where the capital city of the country is placed. Since there is not national noise regulations, each Department has its own noise ordinances.

Montevideo noise regulations need a global update. Some of the decrees came into force during the 1970s and 1980s [1]. Thus, they are not suitable for regulate our times’ noises and style of life.

During 2021, the Municipality of Montevideo and the technical team of the Environmental Engineering Department (DIA-IMFIA) of the Universidad de la República have worked together on a reformulation of the legal texts. Technical criteria, control parameters and their standard values were updated; measurement procedures and data processing were also specified [2].

This article presents the current regulations’ contents about leisure noise and the update proposal, emphasizing on the suggested new measurement procedures to avoid the necessity of measuring inside the neighbors’ homes.

2. BACKGROUND

2.1 What is ‘social noise’?

Social noise refers to the noise outside a leisure place during its operation time, that is caused by people agglomeration outdoors. People are usually not only smoking, but speaking, singing, shouting or making different types of noises (e.g., music or engines’ noise from motorcycles). Usually, music can be heard outdoors, specially the low-frequency sounds, e.g., the rhythmic basis of the music.

When these activities occur close or into residential zones, a conflict of interests emerge: some people want/need to sleep while others want to enjoy the night, dancing or listening to music.

2.2 Sound regulations in Europe

In Europe, the standards for sound pressure levels inside or outside a venue vary from one country to the other. In some cases, regulations are really demanding, while in others, are closer to be recommendations than standard values that must be accomplished.

The European network of live music associations LIVE DMA prepared a diagnosis about sound pressure levels related to leisure night activities [3]. In the report, LIVE DMA used regulations from 10 European countries; the main results are in Table 1.

Table 1. Permissible sound pressure levels (by night) for music/noise emission in venues (based on [3])

Country	Inside the venue	Outside the venue
Belgium	<p>Flanders & Wallonia: 100 dB(A) at 60 min Front of House (FOH). Control by measuring L_{eq} at 15 min > 102 dB(A)</p> <p>Brussels: 100 dB(A) and 115 dB(C) at 60 min FOH</p>	<p>– Under 85 dB(A) at 60 min: no need to do anything</p> <p>– From 85 to 95 dB(A) at 60 min: earplugs are to be provided by the responsible of the event/place and publicly screen the sound levels</p> <p>– From 95 to 100 dB(A) at 60 min: same requirements + need a person in charge of sound who has gone through a specific training provided by the Authorities</p>
Spain (Catalonia)	105 dB(A)	<p>– 9 pm to 11 pm: 60 dB(A)</p> <p>– 11 pm to 7 am: 50 dB(A)</p>
Finland	No straight legal sound regulations. Usually 96-102 dB L_{Aeq} 5 min FOH.	Night-time: 55 dB
France	102 dB(A) on 15 min 118 dB(C) on 15 min	/
Germany	<p>Recommendation:</p> <p>– 99 dB(A) at 30 m</p> <p>– Maximum allowed L_{peak}: 135 dB(C)</p>	Night-time: 35 to 50 dB(A)
Latvia	No straight legal sound regulations.	Regulations depend on the 5 different areas

Country	Inside the venue	Outside the venue
		<p>categories of the city.</p> <p>Night-time: 40 to 55 dB(A)</p>
Netherlands	<p>For VNPF members: 103 dB(A) at 15 m. (VNPF is the association of Dutch live music sector)</p> <p>– Several labour conditions to respect regarding noise protection</p>	<p>Regulations depend on the municipalities.</p> <p>Between 40 dB(A) and 65 dB(A), depending on the hour and the area.</p>
Sweden	<p>– 100 dB(A)</p> <p>– Presence of kids under 13: 97 dB(A). Kids can come at some festivals if they wear ear protection</p>	/
Switzerland	<p>Regulations depend on the 26 cantons. They also depend on the categories of events.</p> <p>Only for amplified sound:</p> <p>– Limit value is 100 dB(A) average per hour</p> <p>– The momentary value must never exceed 125 dB(A) at any time.</p>	/
United Kingdom	<p>For the workers:</p> <p>– 87 decibels for daily or weekly personal noise exposure ($L_{EP,d}$ or $L_{EP,w}$)</p> <p>– Maximum allowed L_{Cpeak}: 140 dB(C)</p> <p>For the audience: no straight legal sound regulations, but recommendations.</p> <p>– Over the duration of the event: Event L_{Aeq} should not exceed 107 dB</p> <p>– Maximum allowed L_{Cpeak}: 140 dB(C)</p>	<p>Regulations depend on the venue category and the number of concert days/year:</p> <p>– From 1 to 3 days/year: Music Noise Level (MNL) from 65 to 75 dB(A) on 15 min</p> <p>– From 4 to 12 days/year: The MNL should not exceed by more than 15 dB(A) over a 15 min period</p>

2.3 The MONICA Project

The high night sound pressure levels related to leisure activities is currently an important concern in many countries all over the world, and the European Union is not the exception.

During 2017-2020, an important European Project related to big open-air cultural and sport events was held [4]:

The MONICA Project is a large-scale demonstration of how cities can use IoT technologies to meet sound, noise and security challenges at big, open-air cultural and sport events, which attract and affect many people. Several applications are deployed at large events in six European cities from 2017 to 2020, involving more than 100,000 application users in total, out of which 10,000 will participate in the evaluation process.

The MONICA Project is centered in the application of IoT resources and in demonstrating their potentialities. The results of the Project developed innovations in six different topics, including sound pressure level monitoring and adaptive sound field control, crowd and capacity monitoring and crowd management and communication. The crowd-related issues combined advanced video analytics with object detection, with the aim of giving a security tool for monitoring the environment and behavior of large crowds [4, 5].

The monitoring of sound pressure levels in real time used IoT-enabled sound level meters in different points of the city. The sound field control included two elements: an acoustic screen or shield for the attenuation of high frequency sounds, and an active control device working under an adaptive scheme for cancelling low frequency sounds. An attenuation up to 10 dB was reached in the protected or dark zones [5].

Swedish Authorities had found that the management of low frequencies noise sources was not working well enough, and that the specific guidelines based on third octave band (TOB) analysis performed much better than the A-weighted guidelines. They also studied the main factors with incidence on the perception of the listeners; for them, the “acceptability” of a sound signal was a compromise within the annoyance caused by the sound and its audibility. Thus, the audibility was easier to approach in an objective way and it was what MONICA attempted to do, with successful results [6].

The final recommendations of the Project have shown that there were still a lot of work to do, not only about regulations but also about education for attendees, for decision makers and for local authorities, among others.

2.4 Sound regulations in Uruguay

Noise is a Municipal issue in Uruguay. Even though since 2004 there is a National Act for the Prevention of Noise Pollution [7], it has never been implemented because of the lack of an operative National Decree. No national noise standards but national guidelines are available [8].

Since no national noise standards are available, each of the 19 Municipalities has different local regulations. The permissible sound pressure levels inside the venues and outside (during night-time) are presented in Table 2.

Table 2. Permissible sound pressure levels for music/noise indoors and outdoors (by night) in Uruguay (based on [9])

	Inside the venue	Outside the venue
Canelones	90 dB(A) If higher, a visible warning about risks for hearing is to be placed at the entrance	Regulations depend on the 6 different areas of the city. Night-time: 50 to 75 dB(A)
Colonia	For outdoor venues: no more than 55 dB 50 m from the source; no more than 2 hours long	Night-time: 55 dB
Durazno	--	Night-time: 55 dB
Flores	90 dB	--
Florida	90 dB	65 dB
Lavalleja	120 dBA, with a maximum tolerance of 10 %	--
Maldonado	120 dBA, with a maximum tolerance of 10 %	--
Montevideo	--	Regulations depend on the different areas of the city. Night-time: 34 to 56 dB
Río Negro	--	Night-time: 55 dB
Rivera	90 dB(A)	Night-time: 55 dB
Rocha	105 dB(A) 3 m from the source	Night-time: 55 dB
Salto	90 dB(A)	Night-time: 55 dB
San José	--	Regulations depend on the different areas of the city. Night-time: 34 to 56 dB(A)
Soriano	--	Night-time: 55 dB
Tacuarembó	90 dB(A)	Night-time: 50 dB
Treinta y Tres	75 dB	Night-time: 45 dB 3 m from the front of the premise

As it can be seen, only 8 of the 19 Departments have defined permissible values both for inside the venues and for outdoors sound pressure levels during night-time, but there are also 3 Departments that are not included in Table 2 because they have not neither inside permissible values nor outdoors night-time levels.

Most of the inside permissible values are 90 dB(A), but there are two incredibly high values of 120 dB(A) and another absurdly low (75 dB).

Montevideo only states outdoors night-time sound pressure levels, but it does not regulate the levels inside the venues.

3. SOCIAL NOISE IN MONTEVIDEO

Since 2006, when smoking indoors in public places was prohibited in Uruguay [11], the agglomeration of people outside leisure places began to be more and more frequent. Currently, since there are no dedicated regulations about social noise, it is not easy for the Municipality to manage these issues, because they have not competencies to dissuade agglomerations at public spaces (e.g., streets).

3.1 Current leisure noise control

Montevideo legal frame about leisure noise is old and weak. The main regulations are more than 30 – 40 years old, and they have critical gaps and flows. First, the ordinance refers to “average” values (not to L_{eq} or another well-defined parameter). These values are both A-weighted levels and values in octave bands (OB), but the mentioned frequencies are not the standardized ones: 75 Hz, 150, 300, 600, 1200, 2400 and 4800 Hz. Since these are not the standardized OB, it is not possible to measure these SPL with a standard sound level meter with OB analyzer. Second, the permissible values must be corrected according to the characteristics of the zone in the city, the time (day or night), the season, the duration of the emission, the presence of tones and impulsive noises. Although some of these correction factors are good ideas, no clear explanation about how to determine most of their values is provided. Last but not least, the standard values must be met on the property lines, but there is no information on the measurement procedure [1, 9].

These aspects make it difficult to apply current regulations.

3.2 Social noise management

When speaking about social noise, the main problem occurs outside the venues, in the public spaces. The difficulties for controlling social noise are not only on the regulations: the real practical possibilities of action are not as broad as it would be expected.

First, there is no need to obtain a noise license when a new leisure place opens: it will only be demanded if complaints appear. When a neighbor decides to file a complaint, he/she must demonstrate the damage, beginning by making measurements that usually are in his/her bedroom during nighttime. Having people doing this work at 2:00 or 3:00 in the morning can be felt, at least, invasive.

Also, when there are a lot of people in the street outside a leisure place, the Municipality cannot act there to persuade people to go home or to have a more silent behavior: it is on the police. But the police will only act if ‘public order’ is disturbed, and (fortunately) it is not easy to arrive to a situation where it occurs.

Most of the people who live close to leisure places are not happy at all with the dynamics related to them. The culture of nightlife in Uruguay doesn’t help. Dancing clubs and other night leisure places usually open from 1:00 am to 5:00 – 6:00 am. This is specially annoying to sleep. At the end of the SARS-CoV2 pandemic, maintaining earlier times for the operation of night leisure places was a possibility to improve the coexistence rules.

Since it was not the selected option, it is easy to understand that this is a hot spot in municipal management.

4. THE NEW PROPOSAL

A draft of a new noise ordinance is under discussion in the Municipality [2]. The main differences with the current ones are reported in next subsections.

4.1 Classifying social noise

The proposal for new regulation classifies social noise as ‘*excessive noise*’.

Excessive noises are unjustified or even if they are justified, they can affect health, calm and wellbeing of people because of their high intensity.

They can be controlled or modified to make them tolerable.

4.2 Responsibilities

The proposal for a new noise ordinance states:

‘The agglomeration of people outside a recreation venue during its operating hours will be considered the responsibility of said venue. The high sound levels that this agglomeration of people can generate will be considered as part of the operation of the premises when issuing or renewing the qualifications. Consequently, they may condition the hours of operation that are enabled for the premises in question.’

Faced to any type of complaint, every one that cooperates or facilitates the occurrence of excessive noise, will respond jointly and severally with the material authors of the fault. The responsibilities derived from the violation of any precept of the new Decree, will fall jointly and severally on the author of the action or omission, and on the employers or legal representatives.

4.3 Day time and nighttime

Day time is defined as the period from 07:01 to 23:00. Nighttime is defined as the complementary period, i.e., from 23:01 to 07:00.

4.4 Parameters

In general, the immission SPL will be expressed in terms of $L_{AFeq,1h}$. The SPL corresponding to the nighttime will be expressed in terms of L_{Night} , which can be defined as $L_{AFeq,23:01-7:00}$.

4.5 Need for an operation license

The new ordinance draft defines “public spectacle” as:
“Any place where commercial or industrial, public or private activities are carried out, in which music that exceeds $L_{AF,eq}$ of 60 dB, for at least 30 consecutive minutes in its operating hours, is broadcasted. This value is to be measured inside, with Fast time response, with doors, windows and any other opening closed. It will be considered a public spectacle and must, therefore, have prior authorization from the Municipality for it” [2].

Neither open spaces nor spaces with light enclosures (tarpaulins, fabrics, plastic films, or similar materials) may be enabled to carry out public shows in the terms indicated in the preceding paragraph, unless the Municipality expressly authorizes them.

It will not be possible to install leisure places if there are shared walls with education or health care places.

4.6 How to start the process

The process to reach the Municipality authorization for a new leisure place, begins with the presentation of description, location and plans for the mechanical ventilation and security lighting project; location of music amplifier devices; the noise control and acoustic conditioning of the space (description, calculation, detailed plans, providers of the selected materials); and a management plan to avoid crowds immediately outside the venue and achieve the rapid dispersal of attendees at closing time.

If there are adjoining houses that share a wall with the leisure place, a test to determine its acoustic insulation will be performed. The emission SPL to be used in the test will be defined according to the type of shows the leisure place asks to perform.

According to the Municipal Decree 36.615 [12], the six possible categories are:

- Party halls
- Dances, discos, live music, live shows
- Bars, pubs, restaurants or other places with a gastronomic main line, where live shows or music can have SPL above 60 dBA
- Bars, pubs, restaurants or other places with a gastronomic main line, where shows without amplification are carried out, with an emission limit of 60 dBA
- Combination of various destinations that involve public performances or music broadcasting above 60 dBA
- Cinemas, theaters, auditoriums, soundstages, circuses, and similar places.

If there are nearby houses but they do not share any wall with the leisure place, a measurement will be made at a point immediately outside the house that could potentially be the most affected by the operation of the place. This type of measurement is the equivalent of the FOH measurements mentioned in Table 1.

When the closest dwellings are separated from the leisure place by a street, a measurement will be made at a point immediately outside the dwelling, close to the part that may potentially be most affected by the operation of the leisure place. It is also a FOH measurement.

The results of these tests will condition the closing time of the leisure place to be authorized during the first two years of operation, when the operation license should be renewed. Some examples are presented in Table 3.

Table 3. Latest time allowed for music/noise emission (from [2])

Outdoor measured SPL (expressed as $L_{Aeq,night}$, in dB)	Latest time allowed for noise emissions in the premise (earliest beginning: 23:00)
51	0:00
49	0:50
47	2:00
45	4:10
43	Not limited

There are also permissible values to reach indoors in the neighbors' houses. In any case, these experimental values will be 'sine qua non' condition for getting the municipal authorization.

If complaints due to noise annoyance are presented during the first two years of operation, the renewal conditions will be more demanding than the first authorization's one, according to a continuous improvement strategy.

After the third year of operation, the maximum SPL measured outside the leisure place will be not higher than 48 A-weighted dB.

The exception cases will be those who did not receive any complaints during the last two years and those which have received at least one noise complaint but that could solve it efficiently and effectively, according to the Administration assessment.

4.7 Assessment of the acoustic insulation of a wall

The Ordinance draft includes a set of annexes where the detailed procedures for SPL measurements with different objectives are presented.

The assessment of the sound insulation of a wall can be based on standardized tests (e.g., ISO 16283) or on the procedure included in the draft, that is also based on ISO technical standards.

In any case, when a sound insulation wall is to be tested, the coordination with the neighbor for making the measurements in his/her home will be on the responsible of the leisure place.

4.8 Unusual events

When spontaneous celebrations occur (usually due to sporting or political events), they will be controlled with the same figures used for noise control during traditional holiday periods. The limitations consider that the authorized limits could be exceeded during no more than one (1) hour - continuously or intermittently-, during those celebrations.

However, the Administration shall always have the power to authorize more flexibility of one or more of these SPL and/or schedules, temporarily or permanently, in general or for any zones or activities.

According to the characteristics of the immission noise, the measured sound pressure levels may be corrected (raised) when the contents of tones, impulsive noises or low frequency noises are significant. The maximum correction to be applied should not add more than 9 dB to the measured L_{AFeq} level. All the calculation methods for the corrections are included in the annexes of the new proposal; they are based on the usual international methods to compute them.

In this case, the tools developed by the MONICA Project [4-6] for crowds' management could be a smart way of controlling and preventing noise issues because of lots of people in the streets. The Municipality of Montevideo has an IoT office what can help in the implementation of them.

4.9 Measurement procedures

One of the main problems of the current noise ordinances in Montevideo refers to the absence of methodologies for making SPL measurements or data processing. This is why the new proposal takes this topic into account and includes not only a glossary of acoustic terms that are usually mentioned in urban noise-related issues, but also a set of measurements' procedures. They are mentioned in Table 4.

Table 4. List of Annexes and their contents (based on [2])

Annex	Contents
1- Little Glossary	43 usual acoustic terms, with an easy explanation
2- Corrections to measured levels	Background noise, low frequencies content, tone content, impulsive content
3- Measurements procedures	Sound advertising, reverse alarms, anti-theft alarms at premises and vehicles
4- Noise emission in vehicles	Stationary test
5- Noise emission in rail vehicles	Stationary and dynamic tests
6- Assessment of sound insulation of a wall	Test with pink noise emission
7- Indoor immission SPL	Measurement procedure and data processing
8- Outdoor immission SPL	Measurement procedure and data processing
9- Outdoor immission SPL at the exit time of private or public activities	Measurement procedure and data processing

5. CONCLUSIONS

Currently, this proposal is under discussion at the Municipality. Once the technical and politic discussion is finished, if it is evaluated positively, the ordinance project will be sent to the Departmental Board to consider its promulgation as a Departmental Decree.

The new regulation will improve the guarantees for the leisure activities managers and the neighbors, by having clearer rules for their respectful coexistence. And, of course, it will make it easier to control and manage for the Authorities, aiming for more equity and better quality of life for all Montevideo citizens.

6. ACKNOWLEDGMENTS

The authors acknowledge the Municipality of Montevideo for the financial support of this project. They especially recognize the teams of the Office of Mechanical and Electrical Installations and the Office of Citizen Coexistence for the fruitful joint workspace.

7. REFERENCES

- [1] Intendencia de Montevideo, *Digesto Departamental*. Available online: <https://normativa.montevideo.gub.uy/volumenes>
- [2] González, Alice Elizabeth; Gianoli Kovar, Pablo; Ramírez, Lady Carolina; Suárez Does, Ignacio; Ferrari Álvarez, Luis; Cuadro, María Vivian; Vittorino Carrasco, Sandra; Fajardo, María Betania. *Propuesta de actualización de la Normativa Departamental de Montevideo sobre Contaminación Sonora, Documento de Trabajo N° 3* (Update proposal of the Municipal Regulations on Noise Pollution, Work Document N°3). Convenio IdeM - FJR: Informe Final. Montevideo: FJR, 2021.
- [3] LIVE DMA (2023). *Sound regulations in Europe*. February 2023. Retrieved on 27th June 2023 from: <https://www.live-dma.eu/sound-regulations-in-europe-2/>
- [4] The MONICA Project (2017). *Managing large, open-air events in the city. Technology solutions for noise control, security and user experience*. Funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 732350. www.monica-project.eu
- [5] The MONICA Consortium. *D1.5 Final Report on Innovations and Use and Dissemination of Knowledge. Management Of Networked IoT Wearables – Very Large Scale Demonstration of Cultural Societal Applications* (Grant Agreement No 732350). April 2020.
- [6] Vincent, Bruno; Gissinger, Vincent; Haddad, Karim; Song, Wookeum; Gallo, Enrico; Doucet, Christophe. MONICA, a European project focused on the Internet of Things for the acoustic quality and safety of outdoor large scale events. 11 pp. *INTER-NOISE 2018*, Chicago, Illinois, USA.
- [7] IMPO. *Ley N° 17852. Prevención, vigilancia y corrección de la contaminación acústica* (Act 17852. Prevention, surveillance and correction of noise pollution). Available online: <https://www.impo.com.uy/bases/leyes/17852-2004>
- [8] Ministerio de Ambiente, República Oriental del Uruguay (2023). *Guía: Valores para prevenir la contaminación acústica (2023)*. (Guidelines: Values to prevent noise pollution). Available online: https://www.gub.uy/ministerio-ambiente/sites/ministerio-ambiente/files/documentos/publicaciones/Guia_Valores_contaminacion_acustica_2023_v3.pdf
- [9] González, Alice Elizabeth. *Acústica Ambiental, Cuaderno 3: Normativa departamental vigente en Uruguay* (Environmental Acoustics, Notebook 3: Departmental Regulations in force in Uruguay). Montevideo: FING-UdelaR, 2017.
- [10] Hill, Adam J. (Ed.). *Understanding and managing sound exposure and noise pollution at outdoor events. Technical Document AESTD1007.1.20-05, May 2020*. Prepared by the Working Group on Sound Exposure and Noise Pollution due to Outdoor Entertainment Events, AES Technical Committee on Acoustics and Sound Reinforcement. New York: 2020.
- [11] IMPO. *National Decree 268/005. Prohibición de fumar en oficinas públicas. Prevención de la salud*. (Avoidance of smoking in public offices. Health prevention). Available online: <http://www.impo.com.uy/bases/decretos/268-2005>
- [12] Intendencia de Montevideo, Departmental Decree 36615 of 15 March 2005. Available online: <https://www.gub.uy/junta-departamental-montevideo/institucional/normativa/decreto-departamental-n-36615-fecha-15032018-excepcion>