

THE REVISION OF THE DIRECTIVE 2000/14/EC: A NEVER ENDING STORY

Francesca Pedrielli

Eleonora Carletti *

National Research Council of Italy - STEMS, Via Canal Bianco 28, 44124 Ferrara, Italy

ABSTRACT

The Outdoor Noise Directive 2000/14/EC (OND) harmonizes the laws of the Member States on 57 types of equipment for use outdoors referring to noise emission standards, conformity assessment procedures, noise emission marking and collection of the noise emission data. Being part of the EU strategy to reduce noise at source, this Directive aims to protect the health and well-being of citizens and to protect the environment. To achieve the above objectives it establishes noise limits for 22 out of 57 equipment types, requires the noise emission marking for all the equipment and refers to mandatory test codes for the sound power level determination. The revision process started in 2007 and several studies were commissioned related to the revision of the lists of equipment, the update of the test codes, the adequacy of the conformity procedures, the revision of the noise limit values, the possible merge with the Machinery Directive, and the impact assessment on the European SMEs. Recently, the Commission decided to make use of the empowerment conferred by the OND to amend the Annex III adapting the noise measurement methods to the technical progress through a Delegated Act. This paper aims to retrace the milestones of the revision process highlighting the solutions and decisions proposed by the Commission.

Keywords: *outdoor equipment - noise limit - regulation – guaranteed noise levels.*

*Corresponding author: eleonora.carletti@stems.cnr.it

Copyright: ©2023 Francesca Pedrielli et al. This is an open-access article distributed under the terms of the Creative Commons Attribution 3.0 Unported License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. INTRODUCTION

The Environmental Noise Directive 2002/49/EC (END) [1] is the primary EU legal instrument for identifying and addressing noise pollution. It provides a common framework for the Member States to assess unwanted and harmful noise and it forms the basis for action plans to be established at national level. The END is complemented by a range of legislation which regulates the environmental noise at source. The Outdoor Noise Directive 2000/14/EC (OND) [2], applicable all over the European Union since January 2002, is one of these pieces of legislation. It concerns the noise emissions of 57 different types of equipment and machines for use outdoors, including those used in construction sites, for road maintenance, for gardening and forestry activities. Its main objectives are:

- ensuring a high degree of protection for the health and well-being of citizens and the environment;
- ensuring free circulation in the internal market for the equipment in the scope;
- providing relevant information to purchasers, users and citizens to encourage the choice of quieter equipment.

To achieve these objectives, the OND merged two Directives on test procedures and seven specific product Directives.

The OND defines requirements with regard to the noise marking, the conformity assessment procedures and the test codes to be used. For 22 out of the 57 different types of equipment it fixes also the permissible noise levels. Although formally based on the principles and concepts of the Council Resolution of 7 May 1985 on a new approach to technical harmonization and standards, the OND is an “Old Approach” legislation. In fact, in Annex III, it lays down mandatory methods of measurement of airborne noise for the determination of the sound power level. This means that the manufacturer of outdoor equipment is not free to apply other methods of measurement different from those set out in the Directive. This requirement assures a

strict coherence between noise limit values and measured sound power levels and it permits the comparison of different models and manufacturers, for each equipment type.

Since the OND entered into force, it has been amended three times by:

- Directive 2005/88/EC [3] which defined the stage II noise limits as indicative for certain types of equipment, as they were considered technically unfeasible at the time of implementation;
- Regulation (EC) No 219/2009 [4] and Regulation (EU) 2019/1243 [5] which redefined the Commission and the Committee powers, empowering the Commission to adopt implementing measures for the adaptation of Annex III to the technical progress.

According to Article 20 of the OND, the official base for the full revision of this Directive is the presentation of a report on the experience in the implementation and administration of the Directive by the Commission to the European Parliament and the Council. Originally, this report was scheduled for January 2005, then postponed to January 2007, and every four years thereafter. It had to contain, in particular:

- a) a review of the collected noise data;
- b) a statement of the need for revising the list of equipment subject to noise limit (Art 12) or subject to noise marking only (Art.13), taking into account the technological development;
- c) other aspects helpful to continue the long-term noise reduction by equipment.

Unfortunately, the Commission had not sufficient data to produce this report by the deadline. Since then, different studies were commissioned to take into account not only the elements covered by Article 20, but also other aspects, directly or indirectly correlated. Among them, the economic impact of the revision process on SMEs and micro-enterprises, the possible integration with the Machinery Directive [6] and the improvement of the legal framework of the Directive according to the New Legislative Framework (alignment to the whole set of EU harmonization legislation for health and safety of products). Hereinafter the list of the different studies produced so far:

- the “Study on the experience in the implementation and administration of Directive 2000/14/EC relating to the noise emission in the environment by equipment for use outdoors” (the “NOMEVAL” study), in 2007 [7];
- the “Impact assessment on possible policy options for reviewing the Outdoor Equipment Noise Directive” (the “ARCADIS” study), in 2009 [8];

- the “Study on the merger of the Directive on noise from outdoor equipment, 2000/14/EC, with the Machinery Directive, 2006/42/EC” (the “CEPS” study), in 2013 [9];
- the “Study on the suitability of the current scope and limit values of Directive 2000/14/EC relating to the noise emission in the environment by equipment for use outdoors” (the “ODELIA” study), in 2015-2016 [10];
- the “Supporting study for an evaluation and impact assessment of Directive 2000/14/EC on noise emission by outdoor equipment” (the “VVA” study), in 2017-2018, ended with an “Evaluation Report” [11] and an “Impact Assessment Report” [12].

2. PROBLEMS TO TACKLE IN THE REVISION

The outcomes of the above studies confirmed that the Directive overall complied with the main objectives of the intervention, by improving the previous situation in terms of harmonization of legislation, free circulation of products in the internal market, and reduction of noise emission by outdoor equipment. On the other hand, they also enlightened that after many years from its publication it is absolutely necessary to revise some important issues. The following paragraphs try to summarize the main outcomes from the above studies and the main problems that the revision process should tackle in order to assure the Directive’s capacity to protect the environment and to take advantage of the most recent developments of the New Legislative Framework.

2.1 Problems affecting the Directive’s capacity to protect health and well-being of citizens and environment

2.1.1 Noise limits not updated

The entrance into force of the OND led to a reduction of noise levels by outdoor equipment compared to the previous scenario, especially for equipment subject to noise limits, as shown in Fig. 1.

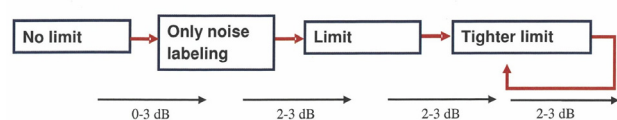


Figure 1. Average reductions of noise emissions due to the introduction of noise limits [7, 10].

Noise limits, indeed, are the main policy instrument of this Directive to ensure that excessive and unnecessary noise is controlled at source, within reasonable technical and economic means.

However, “ODELIA” and “VVA” studies put on view that the current emitted noise levels are still too high to be considered safe for health and well-being. Most of the types of equipment covered by the OND, have a sound power level above 92 dB(A), ranging up to 120 dB(A) for the noisiest ones. In addition, negative impacts on health and the environment are expected to increase if the noise limits in the OND remain unchanged, due to the increase in fleet numbers and types of equipment, as well as to the population growth.

Moreover, the functioning of the Directive for several years had proven that the noise marking is insufficient to encourage manufacturers to develop less noisy products. To face these problems, the “ODELIA” study showed that for nine equipment types it would be possible and advisable to tighten the noise limit values set by Article 12. In addition, the study suggested setting noise limits for 28 equipment types subject to noise marking only, as summarized in Fig.2 [10].

Art.12: tighter limits proposed for:

- 8. Compaction machines
- 9. Compressors,
- 10. Concrete-breakers and picks, hand-held,
- 32. Lawnmowers
- 33. Lawn trimmers/lawn edge trimmers,
- 36. Lift trucks, CE driven, counterbalanced
- 38. Mobile cranes,
- 45. Power generators (< 400 kW),
- 57. Welding generators

Art.13: new limits proposed for:

- 1. Aerial access platforms with combustion engine
- 2. Brush cutters
- 5. Building site circular saw bench
- 6. Chain saws, portable (CE and Electric)
- 7. Combined high pressure flushers and suction vehicles
- 11. Concrete or mortar mixers
- 13. Conveying and spraying machines for concrete and mortar
- 15. Cooling equipment on vehicles
- 17. Drill rigs (percussive)
- 22. Glass recycling containers
- 24. Grass trimmers/grass edge trimmers
- 25. Hedge trimmers (CE and Electric)
- 26. High pressure flushers
- 28. Hydraulic hammers
- 30. Joint cutters
- 34. Leaf blowers (CE and Electric)
- 35. Leaf collector (CE and Electric)
- 36b. Lift trucks, CE driven, counterbalanced
- 39. Mobile waste containers
- 42. Piling equipment
- 45b. Power generators (≥ 400kW)
- 46. Power sweepers
- 47. Refuse collection vehicles
- 49. Scarifiers
- 50. Shredders/chippers
- 52. Suction vehicles
- 55. Truck mixers
- 56. Water pump units (not for use under water)

Figure 2. List of equipment in the “ODELIA” study for which tighter or new limits are proposed.

The proposed changes were based on robust criteria, related to:

- environmental need: relevance for noise problems in one or more Member State and requests or specific information from Member States including policy or position papers;
- environmental impact: medium or high impact, e.g. high noise levels, large numbers of affected population;
- technical feasibility: technical progress and available new technology, if evident.

These studies gave a clear indication to the Commission that solutions for lower noise emissions are available and necessary.

2.1.2 NOISE database not useful for its intended purpose

Article 16 of the OND requires the manufacturers to provide a copy of the EC declaration of conformity for each type of equipment and the Commission to publish the relevant information periodically. The idea behind this article is that the noise data collection is a necessary basis for assessing the technical feasibility of future legislative actions by the Member States and the Commission.

Until 2020, the data entry was manual: manufacturers sent their data to the Commission and the information were then manually entered into the EU database. In practice, this system proved to be ineffective and the end results were more limited than expected.

The usefulness of this article was largely discussed by Member States, institutional and industrial stakeholders and two different positions came out on this question:

- a) Art.16 should be removed because the compliance with its obligations imposes an excessive administrative burden on manufacturers, Member States and EU Commission in comparison to the limited value of the database (supported by the “CEPS” study and several industrial associations).
- b) Art.16 should remain because it is the only source of evidence that permits to take sensible decisions about the limit values (supported by Member States, Notified Bodies, Administrative Cooperation Group for Market Surveillance (ADCO)). As a matter of fact, the experience in the “ODELIA” study on the suitability of the current scope and limit values showed the fundamental role of this database, despite its limitations.

Those who were in favor to remove Art.16 proposed to supersede the database by periodical technical studies aimed at assessing the state of the art of the equipment noise emissions and giving information on new technological

developments. The advantage of such an approach would have been the elimination of the administrative burdens for the Member States and the manufacturers. These studies, indeed, would have represented an economical burden for the European Commission only.

Those who were in favor to maintain Art.16, on the contrary, proposed the Commission to replace the actual database with a more comprehensive system with a new structure, renovating features and the improvement of automatic controls to avoid clumsy errors. In such a way, the database could have become an essential element to improve several aspect of the current Directive, such as the CE marking and the effectiveness of the market surveillance. A specific proposal on this issue was presented to the Commission also by the authors [13, 14].

The Commission has not taken any official position on this open question, by now.

2.1.3 Lack of consumer awareness in noise emissions

One of the main targets of the OND is to inform and educate consumers by providing meaningful information on the noise emissions and then encouraging the choice of quieter equipment.

In this respect, the OND establishes a labelling obligation of the guaranteed sound power level for all the equipment in its scope. The purpose of this label (Fig.3) is to inform, to raise awareness and to encourage consumers to ‘buy quiet’.

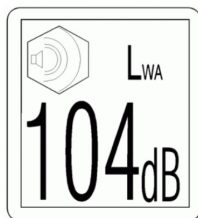


Figure 3. The current noise emission label.

However, the “VVA” study showed that the “average” consumer lacks both awareness and basic technical knowledge on noise emissions and their impact on environment and well-being. Fig.4 summarizes the results of the survey performed in the frame of this study, on the demand from the market for quieter equipment [11]. It resulted that public authorities are the only ones with sufficient interest in low noise emission equipment in comparison with professional/leisure consumers. Unfortunately, the lack of market demand for quiet equipment leads to a lack of incentives for manufacturers to

compete on lower noise emissions, especially when this comes at the expense of other features. This is especially significant for equipment types under Article 13, which are not subject to specific noise limit values.

Demand from the market	Not at all/ to a small extent	To a moderate extent	To a large extent/very large extent	Total
Business	53% (201)	30% (116)	17% (64)	100% (381)
Consumers	44% (75)	36% (61)	20% (34)	100% (170)
Public authorities	38% (49)	27% (35)	35% (46)	100% (130)

Figure 4. Demand from business, consumers and public authorities to provide quieter equipment [11].

Then, the labelling provision, appears to be insufficient to motivate consumers to buy equipment producing lower noise. This is probably due not only to the difficulties in interpreting the given information in decibel but also to the meaningfulness of the guaranteed sound power level that, only by itself, it does not explain how noisy a given product is compared to similar ones.

A revision of the current marking system was proposed [15] with the objective to stimulate the increase of the awareness on noise emission and to drive the consumers' choice toward less noisy equipment.

The proposed revised noise label makes it possible to show not only the absolute value of the guaranteed sound power level but also a relative information on where that level is placed on a scale representing the noise levels emitted by items of the same type of equipment (see Fig. 5). It reports classes of sound power levels (similar to energy efficiency classes) in order to permit the comparison of the noise level of different types of products and to identify the less noisy one. In this respect, a procedure for the identification of sound power classes was proposed by the authors [13, 16].

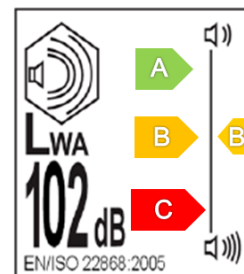


Figure 5. New graphical format of the proposed noise label, following an idea of [15].

2.1.4 Lack of Market surveillance

One of the objectives of the OND is the fair competition, which can be assured by an effective market surveillance. Unfortunately, significant shortcomings have happened in market surveillance during the operational time of the OND, mostly dependent on the lack of sufficient resources allocated to this specific area. This undermined the ability of this Directive, as it may happen that non-compliant equipment reaches the market and puts compliant manufacturers at a competitive disadvantage compared with those who ignore the legislation. Nevertheless, although the Directive did not reach its full potential, “NOMEVAL”, “ODELIA” and “VVA” studies showed that citizens exposed to noise emission from outdoor equipment are still better protected compared to how they would have been without the Directive. However, these studies also pointed out that from now on, it is absolutely necessary to take actions in order to guarantee fair competition.

2.2 Other general issues affecting the adaptation of the OND to the technical progress

2.2.1 Noise test codes and measurement methods

The OND establishes “basic noise emission standards” and mandatory methods of measurement of airborne noise for the determination of the sound power level (Annex III), with the purpose to guarantee fair comparability of the results. Unfortunately, this system appears to be too rigid with respect to the evolution of feasible and reliable technical solutions to measure the noise emissions for different equipment. Outdated references to measurement standards, even if already withdrawn and replaced by new standards, continue to be mandatory for the OND. This causes uncertainty, misunderstandings and unnecessary costs for operators, in particular in the relationship with other EU pieces of legislation which use technical solutions laid down in “harmonized standards” regularly updated (as in the case of the Machinery Directive).

A possible solution to overcome this problem could be the alignment to the New Legislative Framework, the conversion of the OND into a Regulation and the possible adoption of a delegated act for the amendment of the Annex III. However, taking into account that the current set of noise limit values were established on the basis of specific noise test codes, before changing a test code a specific study should be carried out in order to enlighten the differences in the sound power results between the old and the new codes. Without such tests, the Delegated Act could have a negative impact on the measured sound power level of equipment subject to noise limits.

3. THE REVISION PROCESS: STATE OF PLAY

3.1 Report on the experience in the implementation and administration of the Directive

In 2018, the Commission supported a last study (the “VVA” study) that had to evaluate the impact assessment of all the several proposals and policy options for the revision of the Outdoor Noise Directive [12].

The data collection for this study included the previous studies, a desk research, a semi-structured interview program with different types of stakeholders at EU and national levels, an online survey and a set of structured phone interviews with companies and SMEs.

Four possible policy options were identified and evaluated:

- 1) the “no change” option;
- 2) the repeal of the Directive;
- 3) the pure alignment of the OND to the New Legislative Framework and its conversion to a Regulation;
- 4) the full revision of the legislation, including not only the alignment to the New Legislative Framework and conversion into a Regulation, but also changes in the substantial contents of the current legal act.

For each of them, the benefits, the negative effects and the costs for industries were estimated as well as the correspondent impact on noise emissions and the environment.

On this basis, in 2020 the Commission finally published the report required by Art. 20 on the experience in the implementation and administration of the Directive [17]. This document reaffirmed the effectiveness, the efficiency, the relevance and the coherence of this Directive, which assures an added value at EU level for the health/well-being of citizens and the environment, as well as for assuring the free circulation in the internal market for equipment in its scope. It also confirmed that there are a number of critical aspects affecting its operation (all those above reported). Finally, referring to the revision process, the Commission identified only two possible scenarios:

- the enactment of the empowerments for delegated acts foreseen in the OND;
- a full revision of the Directive.

3.2 Choice of a Delegated Act amending Annex III

In 2021, after the publication of the Art. 20 Report, the Commission encouraged the members of the Expert Group on Outdoor Noise Emission to express their views about the two possible options of revision:

- a) to amend Annex III and to adapt the methods of measurement of airborne noise to technical progress through a Delegated Act;

b) to carry out a full revision trying to take into consideration the several critical aspects affecting its operation.

The Commission also clarified that an impact assessment would have not been necessary for the amendment of Annex III, while, in the case of the full revision, the current impact assessment would have required an additional cost-benefit study for the different options, according to the requirements of the Regulatory Scrutiny Board. This would have extended the time for the process and the first full revision proposal would have been expected for the second semester of 2023. On the contrary, starting working soon on the amendment of Annex III, a delegated act would have been adopted, hopefully, by the second half of 2022.

In their meeting of March 2021, the majority of the members of the Expert Group on Outdoor Noise Emission expressed their support to the amendment of Annex III swiftly followed by a complete revision of the OND.

The Public Consultation on the draft Regulation amending Annex III was finally launched only on 5 May 2023, due to a series of bureaucratic fulfillment required to reach the final text of this document. In the absence of further delays, the authors expect the new Regulation could enter into force at the beginning of 2024 but the proposed date of its applicability is 24 months from its entry into force.

This means that this first piece of revision of the Directive 2000/14/EC will affect equipment placed on the Union market not before three years from now.

Moreover, where doubts about the conformity of equipment subject to noise limits arise due to a change of the noise measurement methods, the manufacturers will be allowed to declare the noise values measured according to the original methods established by the Directive, as long as the noise limits laid down in Art. 12 are not revised.

4. CONCLUSIONS

Even more than 20 years after its first drafting, the Directive 2000/14/EC is generally considered a good piece of legislation which in these years of application has achieved its aim to protect the human health and well-being of citizens, as well as to protect the environment. The Directive was and still is the primary force driving noise emission reduction for outdoor equipment. Nevertheless, it needs to be revised because there are several issues that affected its operation; mainly, ‘noisy’ equipment still out of its scope, test method for hybrid/electric machines not foreseen, and outdated references to measurement standards already withdrawn and replaced by new standards.

For the evaluation of the Directive, different data sources were used, various Member States and stakeholders’ consultations in the relevant working parties were carried out, as well as several studies were undertaken, to collect updated information on the performance of equipment in the scope and to explore the need and possibility for revision.

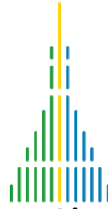
While the amendment of Annex III through a delegated act will not address all the problems identified by the evaluation, it will solve more quickly, in comparison with a complete revision of the Directive, one of the most critical issues, which is the update of the noise measurement methods in line with the technical progress and consequently also in line with the standards used under the Machinery Directive.

Unfortunately, the process for the amendment of Annex III through a delegated act is lasting longer than expected and it could probably not finish before the end of 2023.

The applicability of the Delegated Regulation will be after 24 months but some pieces of equipment subject to noise limits could be excluded by its application, to avoid the non-compliances due to guaranteed sound power levels, calculated with the new measurement methods, to be compared with permissible sound power levels that have not been updated accordingly.

5. REFERENCES

- [1] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise, OJ L 189, 18.7.2002, pp.12-25.
- [2] Directive 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors, OJ L 162, 3.7.2000, pp.1-78.
- [3] Directive 2005/88/EC of the European Parliament and of the Council of 14 December 2005 amending Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors, OJ L 344, 27.12.2005, pp.44-46.
- [4] Regulation (EC) No 219/2009 of the European Parliament and of the Council of 11 March 2009 adapting a number of instruments subject to the procedure referred to in Article 251 of the Treaty to Council Decision 1999/468/EC with regard to the regulatory procedure with scrutiny. Adaptation to the



forum acusticum 2023

- regulatory procedure with scrutiny - Part Two, OJ L 87, 31.3.2009, p.112.
- [5] Regulation (EU) 2019/1243 of the European Parliament and of the Council of 20 June 2019 adapting a number of legal acts providing for the use of the regulatory procedure with scrutiny to Articles 290 and 291 of the Treaty on the Functioning of the European Union, OJ L 198, 25.7.2019, pp.286-287.
- [6] Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast), OJ L 157, 9.6.2006, pp.24-86.
- [7] M. Dittrich, F. de Roo, E. Gerretsen, A. Burgess, H.J. Beckman, G. Spellerberg, P. Cellard, and A. Bowker: “Study on the experience in the implementation and administration of Directive 2000/14/EC relating to the noise emission in the environment by equipment for use outdoors (NOMEVAL)”, EC Enterprise and Industry Directorate-General Mechanical, Electrical and Telecom Equipment, 2007.
Available at:
<https://ec.europa.eu/docsroom/documents/1639/>
- [8] M. Van Acoleyen, K. Callebaut, F. Vöhringer, L. Franckx, S. Vermoote, and B. Van Herbruggen: “Impact Assessment Study on possible policy options for reviewing the Outdoor Equipment Noise Directive (ARCADIS)”, EC Enterprise and Industry Directorate-General New Approach Industries, Tourism and CSR Mechanical, Electrical and Telecom Equipment, 2009.
Available at:
<https://ec.europa.eu/docsroom/documents/1635>
- [9] J. Pelkmans, A. Correia de Brito, A. Griner, and G. Luchetta: “Study on the merger of the Directive on Noise from Outdoor Equipment, 2000/14/EC, with the Machinery Directive, 2006/42/EC (including an evaluation of Directive 2000/14/EC) (CEPS)”, EC Directorate General Enterprise and Industry, 2013.
Available at:
<https://ec.europa.eu/docsroom/documents/4985>
- [10] M. Dittrich, G. Spellerberg, E. Carletti, and F. Pedrielli: “Study on the suitability of the current scope and limit values of Directive 2000/14/EC relating to the noise emission in the environment by equipment for use outdoors (ODELIA)”, EC Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, 2016.
Available at:
<https://ec.europa.eu/docsroom/documents/18281>.
- [11] European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Hausemer, P., Mobilio, L., Dittrich, M., et al., Supporting study for an evaluation and impact assessment of Directive 2000/14/EC on noise emission by outdoor equipment: evaluation final report, Publications Office, 2018.
Available at:
<https://data.europa.eu/doi/10.2873/48>
- [12] European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Mobilio, L., Dittrich, M., Hausemer, P., et al., Supporting study for an evaluation and impact assessment of Directive 2000/14/EC on noise emission by outdoor equipment : impact assessment final report, Publications Office, 2018.
Available at:
<https://data.europa.eu/doi/10.2873/411977>
- [13] E. Carletti and F. Pedrielli, “IMAMOTER Postion paper on Noise Emission Database for Outdoor Equipment and Noise Labelling”, European Commission, NOISE/16/1/06, 2016.
Available at:
<https://circabc.europa.eu/ui/group/073fa6a8-b0c5-461a-9c17-4e35ebed694d/library/94ec0cc8-eae7-4ec0-b047-a1a8fe2c6d82/details>
- [14] F. Pedrielli and E. Carletti, “The Directive 2000/14/EC on the noise emission by equipment for use outdoors and its database for the collection of noise data”, in *Proc. of the 23rd International Congress on Sound and Vibration*, (Athens, Greece), pp. 1-6, 2016.
- [15] F. Gwosdz, “Noise labelling: an integrated approach to noise reduction”, in *Presentations of the Buy Quiet Symposium*, (Paris, France), 2011.
- [16] E. Carletti, and F. Pedrielli, “Outdoor machinery: a reliable statistical approach for a new noise labelling based on current noise emission marking data”, in *Proc. of the 23rd International Congress on Sound and Vibration*, (Athens, Greece), pp. 1-8, 2016.
- [17] Report from the Commission to the European Parliament and to the Council on the implementation and administration of Directive 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors, European Commission, COM/2020/715 final, 2020.
Available at:
<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:715:FIN>