ENVIRONMENTAL REGULATIONS ON INDUSTRIAL NOISE IN BELGIUM

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1. INTRODUCTION

Environmental impact statement in Belgium has been enforced by decree since 1987 and 1989. It applies to specific industrial and public projects that could affect the environment. Noise is one of the aspects that matter. The regulations comply with the EEC-recommendation 85/337 from 27.6.1985.

Recently, existing environmental regulations were revised, completed and re-arranged to form a set of new regulations, named environmental licence regulations. Within these regulations an environmental impact statement and an environmental survey may be required with the application for the environmental licence, as requested by the authority. It applies to new and existing plants.

The environmental noise regulations stipulate the noise standard, and how it has to be applied in various situations. The regulations also list the type of information that should be recorded and reported.

These regulations are intended to keep the noise burden from new projects within pre-defined limits, and reduce in the long run that from existing sites. Various aspects of these regulations are discussed in the paper.

2. ENVIRONMENTAL REGULATIONS IN BELGIUM

In the new structure of the Belgian State, with one national authority and three regional authorities, some regulations are national matter, other regulations are regional matter. The environmental regulation is regional matter. The consequence is that different regions could have different regulations. Differences, however, are minimized when there exists a EEC-recommendation on the subject. For instance, the EEC-recommendations on lawn mowers is addapted by all three regions.

3. THE ENVIRONMENTAL NOISE REGULATIONS

So far there is no EEC-recommendation on environmental noise from industrial activities, and consequently the regulations and procedures on that matter are different from one region to another. Elaborate regulations apply only to the Flemish region, what does not mean that the other regions, Walloon and Brussels, do not have their regulations. In fact they are somewhat similar to the Flemish in that they use the background noise level as a reference either. But Walloon and Brussels regulations are not well established for the moment and rather loose when compared to the Flemish regulations.

The noise regulations were recently adopted by the Flemish authority and they were claimed to be leading. The Flemish regulations, further called Vlarem-regulations[1], are discussed in the paper next.

4. ENVIRONMENTAL NOISE CRITERIA

The Vlarem-regulations order noise criteria, $L_{Aeq,in}$, for the ambient noise level during the day, the evening and the night, and for the different areas as defined by the land-use regulations. These are listed in Table 1.

Table 1. Environmental noise criteria, $L_{Aeq,in}$, in dB(A)

Indication of Area(*)	Day	Evening	Night
1. Rural areas, etc.	40	35	30
2. Residential areas, etc. within 500 m from industrial zones	50	45	45
3. Residential areas, etc. within 500 m from workshop zones	50	45	40
4. Residential areas, other from 2. and 3. above	45	40	35
5. Industrial and artisanal areas	60	55	55
6. Some recreation areas	50	45	40
7. All others, except bufferzones, military ground, airports, etc.	45	40	35
8. Buffer zones	55	50	50

(*) For a complete definition of the areas, the text of the regulations should be considered.

The procedure for new projects is different from that for existing plants. For existing plants the criteria are decisive and set the noise limits. For new projects the limits could be lower than the criteria from Table 1.

Setting the noise limits for new projects, means that a correction of -5 dB(A) is applied to the criteria, or to the original background noise level, depending on the fact whether the original background noise level is less or higher than the criteria. The regulations are such that higher demands are made on new plants than on existing ones, and that the requirements are made more severe in quiet areas than elsewhere.

The ambient noise level must be measured. This can be done by measuring over one time interval, but preferably should be done over several time intervals, and such that the total measurement time represents and covers at least one complete working day. There is one exception on this rule when a restricted survey is requested with the measurement time reduced to 15 minutes.

The long-time measurements result in a set of L_{Aeq} levels for every hour of the working day, or result in several sets, one for each considered working day. The data of several sets should be reduced to one set by arithmetically averaging the values to the hour.

Finally, the outcome of the measurements gives three averaged $L_{Aeq,1h}$ levels, and is found by avering all measured values for the day time, all values for the evening, and only the least four values for the night time. The outcome of the measurements can then be compared with the criteria, and with the specific noise limits if applicable.

5. DISCUSSION

5.1 The noise limit

5.1.1 New projects. The regulations point out, as explained before, how the background noise level of the original ambient noise is to be measured. This level is then compared with the criteria, and dependent on the outcome and on the kind of area to which the site belongs there is a correction of -5 dB(A), either to the background level or to the criteria. This sets the limit to the specific noise.

5.1.2 Existing plants. The procedure is similar to new projects, except for the correction which is not applicable. It defines the limit set to the residual noise.

5.2 The evaluation.
The evaluation of the situation is made by comparison of either the specific noise level or the residual noise level with the noise limit. The specific noise level and the residual noise level is said in the regulation to be the $L_{A95,1h}$ of the ambient noise.

5.3 Other descriptors in the noise regulations.
The Vlarem-regulations also mention $L_{Aeq,T}$ and $L_{Ar,T}$ as available noise descriptors, and define "rating level, $L_{Ar,T}$" as the $L_{Aeq,T}$ level corrected for tonal and impulsive components. However, no figures are specified neither for the time interval T, nor for the tonal and/or impulsive character of the noise. The regulations also omit to describe how to apply these descriptors.

6. COMMENTS

Using the L_{A95} instead of L_{Aeq} for the assessment of the noise impact is unique and rather strange. The consequence is discussed further.

a. Suppose, the specific noise is a stable noise. In that case the specific noise will determine the noise floor of the ambient noise, and both the L_{A95} of the ambient noise and the L_{Aeq} of the specific noise will come out at nearly the same figure. And so, the assessment can either be based on L_{A95} and L_{Aeq}.

b. Suppose, the specific noise is a fluctuating or an intermittent noise. In that case the L_{A95} and L_{Aeq} will not be the same, and differences may be quite important. The assessment based on the L_{A95} may largely underestimate the impact of the noise, as illustrated by the next example.

Example. This is a case where the specific noise is a fluctuating noise, superimposed on a continuous noise. It lasts for about 30 minutes. The graph shows a sample of about 6 minutes from the ambient noise whith the specific noise on. The analysis shows the results for one hour as required by the regulations. Table 2 shows these results. For information purpose, the results taken over the time interval when the specific noise is on are also shown.

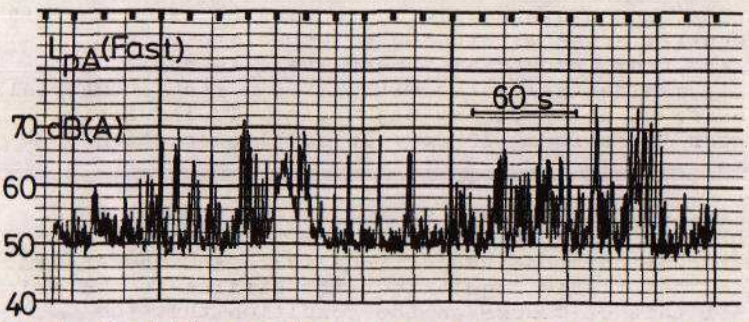
The business is situated in an urban residential area as specified in Table 1, area 4. The noise limits imposed by the authority are: $L_{A95,1h}$ not more than 45; and, $L_{A1,1h}$ not more than 65. The figures in Table 2, for T=1 hr, show that there is

no violation of the noise limits.

Table 2.

Noise descriptor	T=1 hr	T=30 min
$L_{As,T}$	62	65
$L_{A95,T}$	42	48
$L_{Aeq,T}$	56	58

However, in this particular case and for the sake of good practice, the assessment should be based on the L_{Aeq} level, albeit in contradiction with the Vlarem-regulations. Also, it would be good practice to take into account a reference time interval and character corrections. Then, the results would suggest that complaints are very likely and founded.



Graph. Evolution of the ambient noise, in dB(A), when the specific noise is on.

If one would argue that the example is an exceptional case, suffice it to say that there are numerous fluctuating and intermittent noise sources, like cooling fans, boilers, compressors, and so on, in factories situated in or near residential areas. The assessment based on L_{A95} does not work for these sources.

Suppose, after all, L_{Aeq} is meant instead of L_{A95}, the question that rises is how severe and how realistic are the criteria.

In the more stringent situation there is a minus 5 dB(A) correction to be applied on the Vlarem criteria. Considering an hypothetical site in an originally quiet area, the limits for $L_{Aeq,in}$ levels for the first five areas would read like Table 3.

Table 3. Limits for the specific noise, $L_{Aeq,in}$, in dB(A), in areas with low background level.

Indication of area	Day	Evening	Night
1. Rural areas, etc	35	30	25
2. Residential areas, etc. within 500 m from industrial areas	45	40	40
3. Residential areas, etc. within 500 m from workshop areas	45	40	35
4. Residential areas, other from 2. and 3. above	40	35	30
5. Industrial and workshop areas	55	50	50

Taking 35 dB(A) as the basic criterion for rural areas during day time, one will find from the figures in Table 3 that there is a systematic correction of -5 for the evening and -10 dB(A) for the night time, and a systematic correction of +5 either +10 dB(A) for residential areas within 500 m respectively from workshop zones and from industrial zones. There is one exception, namely residential areas within 500 m from industrial zones have an extra +5 dB(A) during night time. To industrial and workshop areas there is a +20 to + 25 dB(A) correction applied.

These figures, including the basic criterion of 35 dB(A) for quiet areas, correspond fairly well with the noise criteria in the former ISO-recommendation-1996[2] from 1971. And therefore one can conclude that Vlarem regulations are similar to the old ISO criteria. All this of course on the condition that the specific noise is evaluated by its L_{Aeq}. If not, the Vlarem regulations are questionable.

7. REFERENCES

[1] VLAREM II. Besluit van de Vlaamse Executieve van 07.01.92 houdende vaststelling van het Vlaams reglement inzake milieuvoorwaarden voor hinderlijke inrichtingen. Ministerie van de Vlaamse Gemeenschap, Aminal, Bestuur Milieuvergunningen.
[2] ISO/R 1996-1971. Assessment of noise with respect to community respons.