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NOISE PREVENTION GUIDELINE FOR OPEN-AIR EVENTS

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ABSTRACT

The present Guideline on Noise Protection for open-air events was elaborated by a working group under the direction of the Vienna Federal Environment Agency Ltd consisting of experts from the Regional Government Offices and the Regional Capital Magistrates. There has been a considerable increase in open-air events being held in inhabited areas. These events range from open-air cinema shows to rock concerts. Unfortunately, organizers of these events do not make available reliable data which would allow experts to make a sound immission prognosis and Austrian guidelines dealing with the assessment of noise exposure in the neighbourhood do not consider rare sources of noise. Moreover, the Austrian law of events provides that the competence in this field lies with the lowest tier, where there is generally a lack of experts in the area of noise protection. The Guideline on Noise Protection attempts to remedy this situation and was designed to be a clear and readily understandable basis for assessment. It includes sound emission data in accordance to event types and size. These data were retrieved through nationwide measurements at events, used to infer acoustic power levels. Furthermore, the Guideline includes a threshold for permissible immission levels based on the frequency of events and their end in time. In order to provide public agencies in charge of events with a tool for making immission prognoses, the Guideline includes simplified propagation scenarios in the form of overheads for various event sizes. By putting these on top of the map of an area concerned and assigning the color representation with the help of the legend it is possible to assess the immissions to be expected. Most of all, this Guideline represents the first basis for assessment to protect event visitors from noxious sound immissions by making provisions that ear plugs must be made available free of charge if a certain threshold has been exceeded and by demanding a maximum rating for the number of people allowed in at events.

1 - INTRODUCTION

The presented noise protection guideline for open-air events was drawn up by a study group under the supervision of the Austrian Federal Office for the Environment, Vienna, consisting of experts from the state governments and from the municipal offices of the state capitals. The number of open-air events being held is increasing, as is their number in residential areas. These events range from outdoor film showings to rock concerts. Reliable information for noise input prognosis is not available from the event organizers, and the Austrian guidelines on evaluating noise in the surrounding neighborhood do not take consideration of rarely occurring noise effects. Moreover, under event law the lowest administrative authority is responsible for events but generally does not have enough noise protection experts. The presented noise protection guideline attempts to cope with this situation and is set up as a simple-to-use, easily understandable basis for noise rating.

2 - CHARACTERISTIC QUANTITIES FOR RATING

In order to ensure simple prognosis, rating and monitoring an index must be determined that can be directly compared to measured values. This deviates from customary rating practice in Austria and other European countries. Generally, measured values are determined as physical parameters and then rated. By taking into consideration the duration and characteristics of the noise a rating level is acquired that approximately describes the disturbance effect on a person of average sensitivity. When the limits according to the known noise properties are also expressed as $L_{A,eq}$, the rating is the same. Moreover, the following advantages are given:

- The $L_{A,eq}$ necessary for the event to be understandable in the rear spectator area is the basis for calculating acoustic diffusion.
- The $L_{A,eq}$ can be read directly from a measuring device when taking noise measurements. Thus, when monitoring and inspecting it is possible to immediately determine whether the provisions of the noise protection guideline are being adhered to.
- Experience has shown that the mean peak level L_1 for light music is only 7 dB to 10 dB above the $L_{A,eq}$. This means that rating according to the $L_{A,eq}$ is stricter than according to the peak level. When the input limits for the $L_{A,eq}$ are adhered to, the criteria for rating according to the peak level are adequately met.
- The average duration of events is known or can be estimated from the accuracy of the noise prognosis, which results from the assumed volume of the loudspeakers. Any error made here is comparatively small. The input limits expressed as $L_{A,eq}$ thus also take into consideration the information content and the duration of the event.

For events ending before 10:00 pm a three-hour duration of music performances, for those ending after 10:00 pm an at least half-hour duration, and thus an event conducted over the entire reference time is assumed. In the proximity of event venues the inputs are to be classed as having an informational content pursuant to ONORM S 5004. The corresponding noise level supplement is +5 dB. This adjustment value is taken into consideration when determining the input limits.

3 - GRAPHIC PROCEDURE FOR NOISE INPUT PROGNOSIS

Studies have shown that in practice there is a direct connection between the exposed area or the number of spectators and the distance between the loudspeakers (loudspeaker towers). Depending on the size of the event or the stage planning this permits the acoustic output level to be determined directly. Measurements have shown that an equivalent continuous noise level of 95 dB is to be expected in the rear spectator area at rock and pop concerts. At videowall events this value is only 85 dB and at outdoor cinemas it is 75 dB. From event to event there can be a deviation of up to 5 dB. Using these basic data the acoustic diffusion situation for various stage sizes is shown in scales of 1:1000, 1:2000 and 1:5000. These noise diffusion situations are printed on a transparent plastic sheet enclosed with the noise protection guideline and include data on loudspeaker intervals and scale. The noise input levels are color-coordinated with the types of events. By superposing the plastic sheet on a floor plan of the event venue the anticipated noise input level can be read up to the first building facade outside the event venue.

4 - RATING NOISE INPUT

If no more than ten event days occur per year and these are not consecutive, the guideline describes these as rare events. For this case the following limits given in $L_{A,eq}$ are proposed for outdoors:

| | | |
|-------|-----------------------|-------|
| day | (6:00 am to 10:00 pm) | 70 dB |
| night | (10:00 pm to 6:00 am) | 50 dB |

Table 1.

Adherence to the above noise input limits for outdoors means that living functions, for example daytime communication, falling asleep at night, can be maintained in the residential area concerned. This can be ensured only when windows are closed. The daytime period can be extended to 11:00 pm under certain conditions, such as for weekends.

If an event is to be held for good reason although the above noise input limits will be exceeded, the number of event days in the calendar year should at least be reduced. This reduction is based on a total dose calculated over the calendar year and is intended to show the local authority that excesses are to be tolerated, if at all, only under very strict conditions. At a noise input level $L_{A,eq}$ of 80 dB only one daytime event is permitted per year. An important aspect of the guideline is that the low noise input limits permitted at night effectively rule out open-air events in heavily populated areas.

| Average sound level L | Number of event days per calendar year | |
|-----------------------|--|----------------------------|
| | End before 10:00 (11:00) pm | End after 10:00 (11:00) pm |
| 80 dB | 1 | 0 |
| 75 dB | 3 | 0 |
| 70 dB | 10 | 0 |
| 65 dB | 30 ¹⁾ | 0 |
| 60 dB | - | 1 |
| 55 dB | - | 3 |
| 50 dB | - | 10 |

¹⁾ is no longer defined as rare by this guideline

Table 2: Number of events per calendar year.

Regular events are generally to be rated according to the prevailing land-use provisions. The limit values given in the guideline are also expressed as $L_{A,eq}$. This also takes into consideration the information content of the event noise and the customary duration of events.

| BUILDING LAND: A-Weighted Noise Input Limit $L_{A,eq}$ in dB | | | |
|--|--|-----|-------|
| Category | Place and Location | Day | Night |
| 1 | Environmentally protected area, spa, hospital | 45 | 30 |
| 2 | Residential area in suburb, weekend house area, rural | 50 | 35 |
| 3 | Residential area, schools, Municipal residential area, area for agricultural and forestry buildings with residences | 55 | 40 |
| 4 | Core areas (offices, shops, Administration without major disturbing noise, residences) area for businesses without noise input | 60 | 45 |
| 5 | Area for businesses with minor noise input (distribution, manufacture, services, administration) | 65 | 50 |

Table 3: Land use provisions.

5 - NOISE LIMITS IN SPECTATOR AREA

The following precautions are to be taken to protect spectators from the effects of noise that could be damaging to their health:

If the type of event leads it to be expected that an average continuous noise level of 93 dB will be exceeded and if adherence to this limit would cause a disproportionate restriction of the event or would entirely change its character,

- the spectators are to be given free hearing protection aids providing at least 15 dB noise reduction, which are to be tested pursuant to ONORM EN 24869-1:1992
- the spectators are to be appropriately made aware of the possible danger to their hearing (a warning printed solely on admission tickets is not adequate).

These are basic prerequisites for rock and pop concerts. Adherence to a limit of 100 dB ($L_{A,eq}$) in relation to the duration of the event's performance is desirous in the entire spectator area.

6 - INSPECTION AND MONITORING

In principle it should be possible to estimate the inputs anticipated for the event so well that measurement monitoring is not necessary. For this purpose the state-of-the-art simplified prognosis of noise input should be applied.

In cases where it is to be expected that limits will be exceeded the authorities can determine or have determined the noise input as follows:

- The noise inputs are measured or determined in places where the spectators and/or the neighbors are most seriously affected.
- The length of time during which measurements are taken depends on the type of event and fluctuations in noise levels, but they must be conducted at least until the $L_{A,eq}$ changes by no more than 0.2 dB for fluctuating noise.
- If there is a sound center (sound engineer, audiomixer), the $L_{A,eq}$ is generally measured there and then calculated for the exposed spectator area and surrounding neighborhoods. The difference in the energy-equivalent continuous noise level is to be applied with the plastic sheet enclosed with the guideline or taken from parallel measurements.

Note: In order to determine the difference in noise level between the monitoring point at the sound center and the particular points in the spectator area and affected neighborhoods parallel measurements should be made during the sound check.