Proceedings of The Institute of Acoustics

CRITERIA FOR NOISE STANDARDS

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In this introduction to the session on noise standards, I would like to put forward some general views on noise standards and guidelines, related to experience over a number of years, and hope that this will lead to a discussion on the merits and otherwise of the standards used in this country at present.

Firstly, one has to decide whether in fact noise standards are required at all, and if so who they are intended for. It is possible in academic and scientific discussions to get lost in the finer detail of some aspects of a noise standard and in doing so to lose sight of the purpose for which it is required by ignoring the real needs of the customer. In the Scientific Branch at the GLC, we are in the position of both being customers needing standards in order to enable us to advise other Departments of the Council, and occasionally other Local Authorities on particular issues, as well as having to set standards ourselves in those cases where none are so far available or we feel them to be inappropriate.

Basically, there are two types of noise standards. Firstly, emission standards are needed for machinery, vehicles, aircraft and other specific noise sources, and the customers requiring these are mainly engineers and manufacturers. Emission standards are required to limit the level of noise so as to cause minimum annoyance or disturbance, compatible with the purpose of the equipment causing it. Ideally, of course, standards should be set so that no-one would be annoyed by noise, there would be no disturbance to sleep, and no enhanced risk of hearing damage. Unfortunately, to achieve this with present or foreseeable technology, could well mean the ending of civilisation as we know it today, and therefore a compromise is required, although the philosophy on which this compromise needs to be based is open to discussion. Low external levels are not in themselves good selling points on vehicles, aircraft or machinery, and, as it costs money to achieve noise reductions, manufacturers need to be persuaded to do so by the legal enforcement of standards. It is unlikely that many manufacturers would be sufficiently altruistic to incur extra costs in the production of, for example, motor cycles, merely to ensure a quieter environment if their less socially responsible competitors could undercut them and probably outsell them, without incurring penalities.

By setting emission standards manufacturers are encouraged both individually and jointly through research organisations to engage in research aimed at achieving these standards by the most practical and economic means. Emission standards need to be considered as being constantly in need of updating, and advances in noise reduction technology can be used to

progressively improve standards, thus ensuring that at least no worsening of the environment occurs, as the number of aircraft, vehicles and other noise emitters continues to increase. This process of improving on previous standards is now taking place, albeit very slowly, examples being the new EEC regulations on vehicle noise limits, and revised ICAO limits for aircraft noise certification.

Immission or environmental standards are required to protect residential areas, the interiors of dwellings, schools and offices, theatres and concert halls, and parks and gardens, to name but a few. In this case, the customers are mainly local authorities, government departments and amenity societies, with the professions mainly concerned being planners, architects and administrators, including Inspectors at Public Inquiries.

Environmental standards are essential for planners and architects whose task it is to provide pleasant and acceptable conditions for future residents or workers, while recognising the conflicting needs of traffic, industry and public entertainment. In planning as in many other fields, prevention is not only better but also cheaper than cure, and by designing to correct environmental standards, future problems can mostly be avoided. Subsequent remedial measures, necessitated by insufficient regard to the environment, can be both costly and unsatisfactory. On the other hand the provision of sound insulation beyond a certain level provides no additional benefit and becomes increasingly costly. It is therefore particularly important for architects to be able to design for optimum sound insulation, and to do so, standards which are relevant, reliable and practical are needed. As in many other matters, financial considerations must always be taken into account and, if limited resources are available, complete noise protection at one site cannot be provided if this implies neglecting some other amenity at that site or if it is at the expense of some other section of the community.

Environmental standards are also needed to provide an objective basis for assessing eligibility and extent of compensation for people adversely affected by noise, and to settle legal disputes. They are also necessary to ensure that as far as possible remedial measures are taken in cases where they are needed most, rather than those where the most articulate and vociferous complainants live or work.

Both for emission and immission standards, it is only rarely that scientists or acousticians are directly involved as customers, although often of course they act as advisers or consultants. Thus it is considered that the most important requirement is that sufficient consideration is given to the relevance of that standard to the particular 'customer' for whom it is intended.

Secondly, the formula on which the standard is based must provide a good correlation between the level of noise and subjective reaction by the listener or between the level of noise and objective criteria, such as speech interference, sleep disturbance, or hearing damage. There is a danger, however, in the case of subjective standards, of too much emphasis

being placed on precision, for example in the evaluation of frequency spectra, while the real factor determining annoyance is overlooked. The level of annoyance is usually dependent not only on the level and frequency characteristics of the noise, but also where and when it is heard and on many non-acoustic factors, such as views on the usefulness of the source causing the noise, to the community and/or the listener, views on the preventability or otherwise of the noise, its possible representation of danger, and other personal attitudes. It seems likely in fact that these non-acoustic factors are of greater importance than the characteristics of the noise, however precisely these are defined, in determining the level of annoyance, and the noise itself is simply the identifiable symbol of these factors.

Thirdly, the standard needs to be in a form where it can be used to make an objective assessment and therefore levels based on it should be readily calculable or measurable, preferably by the customer without external assistance. With the substantial advance in noise measurement technology which has been achieved over the past few years, this problem has become less acute, as even rather complex indices such as Equivalent Noise Level can now be measured by staff with limited specialist knowledge using relatively simple equipment.

The fourth requirement, particularly relevant to environmental standards, is that the formula should be suitable for prediction with a good degree of reliability. It is not sufficient for example merely to have a good correlation between noise exposure and annoyance at one site at one time, if this cannot be reliably used to predict what will happen in the future under different conditions.

Fifthly, a useful asset for an index or formula is that it can be used for a wide range of sources and conditions, particularly as this enables comparisons to be made on the relative importance of different sources in their effect on the overall environment. This is, however, not as important a requirement as the previous four and great care and commonsense is needed if such comparisons are not to be misleading. It seems most unlikely, for example, that if aircraft noise and pop music were both measured and found to give the same level on a particular index, that the response in annoyance terms of similar cross-sections of the community would be similar.

Finally, there are advantages if similar standards are used in different countries, but this is far more important in the case of emission rather than environmental standards. An obvious example is the noise certification of aircraft, where it is essential that all countries use similar methods of assessing the emission levels of aircraft types, both for the purpose of ensuring compatibility in aircraft design and manufacture and also for legislation relating to restrictions or bans on non-noise-certificated aircraft. Similarly, agreement is required between countries on mutually-acceptable methods of establishing noise emission levels for vehicles and machinery, to facilitate trade and ensure that domestic laws are not infringed by imported goods.

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For environmental standards, there seems to be rather less reason for compatibility between countries, even though it may be of interest to make comparisons. Living conditions, design of buildings, climate, differing habits related to various times of day, all tend to make the formulation of universally-acceptable standards both difficult and probably unwise.

It is clearly obvious that no formula or index in use so far, or ever likely to be introduced in the future, is likely to meet all the above requirements and a compromise is required; but where the balance of such a compromise should lie varies with the purpose of the standard and is open to discussion.

A compromise is also required with respect to the level at which the standard is set. On the one hand, the level needs to be realistic and attainable with existing technology, it needs to be economically feasible, and it needs to be enforceable. On the other hand, there is little point in setting an environmental or emission standard unless it has some bite, and either provides an improvement over the existing situation, or at the very least ensures no worsening. This is particularly important, as one risk inherent in any standard is that as well as setting an upper limit, it can also be considered in the form of a licence to go up to that limit. The reaction of people to noise varies enormously, and, however good the standard, some people will remain dissatisfied, while conversely some people appear not to be disturbed or annoyed by noise at almost any level. A decision therefore has to be taken as to what percentage of the population it is aimed to satisfy in setting a particular level. In this case it is necessary to differentiate between effects which merely cause some degree of annoyance, and those which can cause actual hearing damage. Thus while the risk of permanent hearing damage cannot be tolerated for more than a minimal proportion of those exposed to industrial noise, it may have to be reluctantly accepted that some larger percentage of the population cannot be adequately protected from being annoyed.

Finally and perhaps the most difficult problem is to draw a balance between the rights of people to enjoy themselves, as for example by attending pop concerts, and the equal rights of residents to a quiet environment. Compromises are clearly necessary, both by setting limits and restricting times but in the long run the only satisfactory solution is to set a moral standard for people to be considerate and tolerant towards each other.

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