Proceedings of the Institute of Acoustics

THE 1990 EDITION OF BRITISH STANDARD 4142

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INTRODUCTION

BS 4142 was first published almost a quarter of a century ago in 1967, with amendments being issued in 1975,1980 and 1982. In late 1990 work on revising this Standard culminated in the publication of a Second Edition (1). This revision was the work of British Standards Institution Technical Sub-Committee EPC 1/3 "Industrial and residential noise", initially under the Chairmanship of Mr K Marsh of BP, then under the late Dr W A Utley and in its later stages by the author. This paper will describe the background to the revision and outline some of the processes involved. Developments on the topic since publication will also be covered briefly, but as this is still a live issue, the current situation will be explained at the Conference.
It must be emphasised that this paper represents the author's own personal summary of past events and the current position. It is not to be taken as an official view from BSI or NPL.

THE PROCESS OF REVISION SINCE 1984

It is clear from the records that the idea of a major revision of BS 4142 was raised on a number of occasions in the late 1970's and early 80's. A number of contemporary developments seemed to be leaving the Standard more and more isolated from current usage. Among these were the publication of the Noise Advisory Council "Guide to Noise Units" (2), which favoured the phasing in of L_{Aeq}, the so-called Leq Guide (3), and the implementation of the Control of Pollution Act, where for example the technical requirements of Noise Abatement Zones included the use of L_{Aeq}. In fact the formal decision to set the process of revision in motion can be traced to a meeting of EPC 1/3 in February 1984. At that time ISO 1996 Part 1 had been published (4). Parts 2 and 3 were in the final stages. The important question of UK implementation of the ISO Standards was under consideration. The UK had voted in favour of Part 1 and the intention was to publish it as a BS using the system of dual-numbering. In view of this it was felt

necessary to bring BS 4142 into line. At the request of the Sub-Committee, the author convened, in November 1984, an ad-hoc panel of five members, who included an Environmental Health Officer, a noise consultant, a university Professor and two Government scientists. Their task was to consider the subject in a general open-ended way, to examine ways in which the Standard needed to be revised, how the job could be tackled and to report back. In the Autumn of 1985 a discussion paper was prepared which considered such questions as,

Should the Scope be broadened beyond the estimation of the likelihood of complaints, to include assessment of annoyance and nuisance ?
Should the Standard be applicable to other environmental noise sources such as transportation noise ?
Should the tasks of measurement and assessment be the subject of separate documents with the former being covered by a Standard like ISO 1996 and the latter being covered by a set of Guidelines ?
How and when might current research on tonal and impulsive noise be incorporated ?
Should guidance be given on indoor levels ?

The discussion paper set out three options for future action,

Option 1

This would entail a straightforward revision with the main priority being to replace Corrected Noise Level by L_{Aeq}, with other noise descriptors possibly being included. The scope would be restricted to industrial noise sources and to the estimation of likelihood of complaints. Frequently-voiced criticisms of the existing version would be taken into account. The measurement procedure would closely follow ISO 1996 Part 1.

Option 2

In this case the Scope would be widened to include other fixed sources such as sports stadia but transportation noise would still be excluded. The opportunity would be taken to make improvements in procedures for dealing with tonal and impulsive noise.

Option 3
Here a comprehensive revision would broaden the Scope to serve a variety of users, to apply to other environmental noise sources such as traffic and aircraft, and to cover a wide range of situations.

The paper was discussed by EPC 1/3 in January 1986, along with developments on ISO 1996. It should also be recorded that a further possibility which might be called Option Zero was included. This entailed not revising BS 4142, which would eventually mean its withdrawal, without replacement. It was felt the Standard served a useful purpose and that the difficult goal of a revision was worth pursuing. The decision was made to proceed with Option 1, converting to the use of L_{Aeq} and tightening up on measurement specifications and calibration requirements. Since no major study of community response to industrial noise had been undertaken since the original Standard had been written and no new data on noise complaints were available, it would be difficult to justify major changes in the assessment procedure. It is important to note that from the beginning the intention was to provide sufficient information on the assessment of industrial noise, but not to write a detailed text-book.

In May 1986 the detailed framework of the proposed revision was discussed, At that time a four-part Standard with the generic title "Description and measurement of environmental noise " was envisaged. Parts 1 to 3 would be related to the equivalent parts of ISO 1996 and Part 4 would be the revised version of BS 4142. The Sub-Committee had before it a document prepared by the author and Dr Utley setting out, clause by clause, the changes needed to bring the existing version up to date. From this meeting the first real working draft of the revised Standard emerged.

During the following 18 months there were four long meetings of EPC 1/3 with protracted discussions, as key issues were debated, agreement was reached and debates opened up again. The initial draft revision went through several iterations of formal committee comment and redrafting. The idea of the four-part framework was dropped. It was decided to remove all reference to notional

background levels and thereby to the associated corrections. Perhaps the most extensively debated topic was that of the descriptor for the residual or background noise, with the choice being between L_{A90} and L_{Aeq}. It was felt that established use of L_{A90} in the old Standard favoured its retention and that it represented a more appropriate baseline for subjective comparison between a new source and an established noise climate. Use of an L_{Aeq} measure would mean that brief transient noises at a high level above the predominant level of the residual noise could give an inflated value for background noise level. An important change was made in late 1987 with the introduction, into what was by now the sixth draft, of the concept of Reference Time Interval as defined in ISO 1996 to replace the function of the old intermittency correction.

The Sub-Committee agreed in January 1988 to proceed to the key stage of issuing a Draft for Public Comment (DPC). This was circulated widely in May 1988 with a two-month comment period. During the comment period the Institute of Acoustics organised a workshop at which Dr Utley, then Chairman of EPC 1/3 gave a presentation on the background to the draft, and other members of the Sub-Committee assisted in discussion groups. Not surprisingly the DPC attracted a considerable volume of comment during the Summer and Autumn of 1988. When collated clause by clause, these ran to more than 170 pages of text. The volume of comments showed that there was a high degree of interest in the Standard which, some twenty years after it was first written, was still being used by practitioners in the field of environmental noise.

Because of the large number of comments and the impracticability of making real progress with a committee of 30 people, it was agreed by EPC 1/3 that a panel be set up of 5 members. The panel was given the task of reviewing the comments and producing a modified draft for the Sub-Committee. The panel worked hard during the following year to incorporate the comments both general and specific. Although in fact numerically a minority, the most important general comments concerned the change to the use of L_{Aeq}. Since this point was fundemental to the revision, the panel focussed considerable attention on this, whilst attempting

not to get embroiled in re-debating matters which the Sub-Committee had looked at many times over the previous years. Substantial improvements were made to clarify the concepts of measurement time interval and reference time interval. It was during this phase that the specification of a reference time period of 5 minutes at night was introduced with the aim of ensuring similarity of assessment between old and new methods, for intermittent noise. Bearing in mind the danger already referred to, of ending up with a text-book on noise assessment, efforts were made to explain the procedures to be used in various different circumstances. It was at this stage that the three worked examples were included.

Eventually a revised draft based on the panel's work after the DPC stage was presented to the Sub-Committee in November 1989. A number of further refinements were agreed upon particularly in Section 5 on the determination of the specific noise level. These were incorporated by the panel with the expert assistance of Dr J A Nowacki, BSI Project Manager and Secretary to EPC 1/3, to produce a document for processing by BSI Editorial Department in Mid-1990. A number of modifications arising from this editorial process were dealt with by the author and Dr Nowacki, leading to the Approval to Publish being signed in August 1990. The Second Edition of BS 4142 was finally published in November 1990.

DEVELOPMENTS SINCE PUBLICATION

It is probably fair to say that for the first few months of its life the document elicited a fairly quiet response. News of the existence of the revision seemed to spread slowly, but this was soon to change. In April 1991 BSI organised a seminar to introduce the new standard. About 130 delegates attended. Topics covered included the historical and technical background, and the views of the noise consultant and the Environmental Health Officer. There was opportunity for general discussion and delegates formed into working groups, each lead by a member of the final editing panel. Whilst many of the points raised were dealt with either in the groups or in the Open Forum which followed, there were still a large number of matters which were felt to require clarification. It was agreed that BSI would collect together the

various questions and answers in a structured way with a view to issuing an addendum to the documentation of the seminar. Subsequently it was decided that the full Sub-Committee EPC 1/3 would be given the opportunity to contribute to a written response. In addition to the questions raised at the seminar, a number of letters on similar points were received by BSI, as is often the case with a new publication. In order to illustrate the scope of the points raised, the BSI document collating them is reproduced as an Appendix to this paper. EPC 1/3 has recently met to prepare a response to the various questions raised, and to consider where amendments need to be made and additional guidance given, and the form that such guidance might take. At the time of writing the formal BSI response has not been finalised but the latest situation will be reported at the Conference.

Additional short-term feedback is also arising from comments sent to NPL by those involved in the data-sheet project described in a companion paper at this Conference (5).

It should be noted by way of a postscript that the dual numbered BS versions of the three parts of ISO 1996 have recently been published as BS 7445.

CONCLUSIONS

All work on Standards involves a continous cycle of development, implementation, review and revision. The feedback provided by the points raised at the BSI seminar and the other comments received are part of this process in the short term. In the longer term, current research such as the data-sheet project (5) is designed to monitor systematically the application of the revised Standard and to provide much needed data on complaints and rating levels. Additional constructive comment and data are always welcome. It should be realised however that it is unrealistic to expect the Standard itself, even with any additional guidance material, to be the sole, self-contained source of information on the assessment of industrial noise. As was surely the case with the previous version, much of the real knowledge can only come from, and reside in experience.

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REFERENCES

1. British Standards Institution 1990.Method for rating industrial noise affecting mixed residential and industrial areas. BS 4142.
2. Noise Advisory Council 1974. A guide to noise units. Department of the Environment.
3. Noise Advisory Council 1978. A guide to measurement and prediction of the equivalent continuous sound level. London HMSO.
4. International Organization for Standardization 1982. ISO 1996-1. Acoustics - Description and measurement of environmental noise - Part 1 : Basic quantities and procedures.
5. N D Porter 1991. Study of the application of the revised BS 4142 : 1990. These Proceedings.

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Private Circulation | **Document:** 91/54319

Our ref: EPC/1/3

Date: 12 July 1991

Sub-committee EPC/1/3 -
Industrial and residential noise

COLLATED QUESTIONS ASKED AT THE WORKSHOP SESSIONS OF THE SYMPOSIUM ON BS 4142 HELD ON 18 APRIL 1991

GENERAL

1. Nuisance due to noise is usually experienced indoors. Are the measurements in this standard, which are taken outdoors, the most relevant that can be applied to likelihood of complaints?

2. There is a problem of 'creeping background'. The standard does not address this problem, nor does it give any advice on how to deal with it.

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APPENDIX Continued

3. Although the standard is intended to predict the likelihood of complaints, it is used to assess the reasonableness of such complaints. Should not the standard be aimed at satisfying the needs of the user? If the standard cannot be used to assess nuisance, should there not be a separate standard which can be used for this?

Clause 1. How does one deal with situations where the background is less than 30 dB? Does this mean that one cannot predict the likelihood of complaints however high the level of the source noise?

Clause 2. Can the standard be applied to mobile plant within a boundary and is it applicable to mineral workings?

3.2. Why is it recommended that the background noise level should be measured with a fast and not a slow response?

4.2. 1. Is it essential to use NAMAS accredited laboratories?

2. Regarding traceability, how can one compare measuring equipment against a reference set that has been calibrated within the last two years at an accredited laboratory?

5.2. 1. The first edition used an 8 hours period, this edition uses 1 hour. Why is this, and is there any guidance on which 1 hour period should be chosen?

2. What is the distinction between day and night time periods? Should there not be intemediate "morning" and "evening" periods?

3. According to the standard, a night time noise lasting 5 mins is as likely to produce complaints as the same noise lasting for 8 hours. Is this what was intended?

4. Does T_r refer to both background and source noises?

5.3.2. There is an ambiguity in this paragraph. Could the committee clarify the distance from a facia for ground floor measurements? Also, how would one deal with an L-shaped building?

5.4.1. Why was a maximum wind speed of 5 m/s advised on, and why was a minimum temperature of 3 °C recommended? The temperature criterion in particular could be impossible to meet in some locations at some times of the year.

5.4.4. Should intruding extraneous noise be measured?

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APPENDIX Continued

Clause 6. How does one deal with the variation in L_{A90} over time? Should there be advice on sampling and does ISO 1996 deal with this?

7.2 Why is the treatment of tonal noise only scantily addressed?

8.2. 1. Is it right to compare L_{Aeq} and L_{A90}? Should we not compare like with like?

2. How can one combine L_{A90} values?

3. How can one deal with a situation where the L_{Aeq} reading exceed the L_{A90} by more than 10 dB even when the source noise is not operating? In such a situation, the standard would predict a likelihood of complaints for a totally silent machine.

Appendix A.3. Different ratings are obtained for this situation when the original and the revised editions of BS 4142 are used. This throws doubt on the significance of the ratings.

OTHER ENQUIRIES REGARDING THE APPLICATION OF BS 4142 : 1990

Notes. The following questions were not amongst those noted in the workshop sessions, but were received by the Secretary either by letter or telephone. It is suggested that, as they address points that could be of general interest to users, they are added to the above.

4.1 It is not always practicable to make daily calibrations, and most instruments are stable over longer periods. More problems are likely to result from breaking and re-making connections in order to re-calibrate than from not re-calibrating.

Appendix A 1. Is this example valid? The background noise level is below 30 dB.

2. The existing plant noise is regarded as background. This gives rise to creeping background which is deprecated in the planning and noise circular 10/73.

General How would one assess the noise from e.g. a tyre-changing bay, where there is a relatively low background, punctuated by unexpected and irregular short bursts of loud noise?.

JAN/RA 91/54319