



**Acoustics'08
Paris**
June 29-July 4, 2008

www.acoustics08-paris.org

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Simple evaluation of occupational noise exposure without measurements

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In almost any country, employers must assess the noise exposure of the employees. But for small and medium-sized enterprises (SMEs), individual noise measurements are hardly feasible. Therefore, Suva publishes noise level tables, which list typical noise levels of many tools and machines. These 66 noise level tables cover almost any branch of the industry. Moreover, they include shooting noise, music, and so on. However, most SMEs were not able to calculate their workers' long-term noise exposure. Therefore, based on Suva's extensive database, typical noise exposure levels for occupations and activities were calculated. The new type of noise level tables includes now the typical noise exposures for the different occupations. Moreover, since 2007, the noise level tables also indicate the measures to be taken. Therefore, SMEs can start immediately to protect their workers against noise-induced hearing loss.

1 Introduction

In Switzerland, about 8 percent of all the employees or 200'000 persons are still exposed to potentially harmful noise exceeding a daily noise exposure level of 85 dB(A). Despite considerable progress in industrial noise control and individual hearing protection, noise-induced hearing loss is still one of the most frequent occupational diseases.

The Swiss National Accident Insurance Fund (Suva) is the supervisory body for the prevention of occupational accidents and diseases all over Switzerland. Suva's Acoustics Team supports companies in noise control at workplaces.

Since more than 30 years, Suva's acoustic experts have done thousands of noise measurements at workplaces in all branches of the industry. The results are stored in an extensive data base. This data base includes impulsive noise exposure and exposure to sound sources close to the ear (headphones, communication systems). Information about typical exposure time is also available which allows the calculation of typical noise exposure levels.

Suva runs a centralized hearing examination service using 5 mobile units or "Audiomobiles" (fig. 2).

2 Objective

In Switzerland as in most countries, it is the duty of the employer to assess the hazard to hearing, i.e. the noise exposure of the employees. But for small and medium-sized enterprises (SMEs), individual noise measurements are hardly feasible. Moreover, they do not have the knowledge to calculate the noise exposure level if the noise exposure is only part-time. If external advice is sought, there is a fair chance that much effort (and money) is put into the detailed evaluation of the noise exposure instead of taking noise control and protection measures. But in almost any case, the measures to be taken in order to prevent noise-induced hearing loss are much more important than the accurate evaluation of the noise exposure level. In other words: It is not the detailed noise measurement (nor the study of prescriptions how these measurements should be done) that protects employees against noise-induced hearing loss but rather the measures that are taken!

Suva's objective was therefore to provide a simple method for the evaluation of the occupational noise exposure taking into account the limited possibilities of smaller and medium-sized enterprises. At the same time, a noise level data for the assessment of compensation cases was needed.

3 The Swiss Solution

3.1 Noise Level Tables

Suva's extensive noise exposure data base was used to produce 62 noise level tables which cover almost any branch of the industry, from forestry work to professional symphonic orchestras. The noise level tables even include impulsive noise such as on shooting ranges or during shooting exercises. They contain two types of noise data:

- a) Typical noise exposure levels for professions and activities (taking into account a typical temporal exposure pattern)
- b) Typical equivalent sound levels for situations and machines (without regard to individual exposure time)

Whenever the data in part a) are not sufficient, data from part b) may be used to calculate the noise exposure taking into account the relevant exposure time for each and every noise source.

The noise exposure data are updated if necessary on a yearly basis.

The list of the noise level tables available (in French, German and Italian language) and the noise level tables themselves may be found at: www.suva.ch/waswo/86005 and downloaded in PDF format. At this time, only the first part of the noise level table containing the noise exposure data as described above under a) can be downloaded or consulted online in PDF format. The second part containing the equivalent sound levels for situations and machines is only available in printed form.

The noise level tables are also used by Suva in the context of the 40'000 hearing examinations per year on board of one of Suva's audiobiles.

3.2 Alternative methods

It must be acknowledged that not all situations are covered by these noise level tables. In this case, Suva's acoustic team gives support in one of the following ways:

- a) Noise measurement is done by one of Suva's acoustic experts which permits to enlarge the noise data base. This is free of charge for employers if noise-exposed workplaces are concerned.
- b) A simple but robust and reliable integrating sound level meter – checked and calibrated carefully before and after – is sent to the enterprise together with a simple measurement report form.

If there is any doubt about the reliability or interpretation of the result transmitted by the enterprise, Suva's acoustic expert contacts the person that has done the measurements.



Fig. 1: Simple but reliable integrating sound level meter

In this case, the noise measurement is done by a staff member of the enterprise. The sound level meter is then sent back with the noise measurement report form filled in.

4 From noise exposure to action

Today, the noise level tables do not only contain typical noise exposure levels but also indicate the necessary actions to be taken in order to protect the employees against NIHL. So there is no need to consult rules and guidelines to find out which actions are to be taken – just have a look at the noise level table.

In general, measures have to be taken when the daily noise exposure level is equal to or exceeds 85 dB(A). Whenever scientific data or experience indicate an additional hazard to hearing – e.g. due to the presence of ototoxic agents - protection measures may be declared mandatory at noise exposure levels below 85 dB(A).

Additional measures are to be taken if the long-term (with reference to 2000 hours per year) noise exposure level exceeds 85 dB(A).

There are two pre-defined packages of actions to be taken: M1 and M2.

<i>Activité professionnelle</i>	<i>Berufliche Tätigkeit</i>	L_{EX}	M	Aud
Atelier de découpage	Zuschneiderei			
Coupeur	Zuschneider	90	2	A
Forge	Schmiede			
Forgeron	Schmied	95	2	A
Atelier de pliage	Abkanterei			
Chanfreineur	Abkanter	86	2	(A)
Atelier d'estampage	Stanzerei			
Régleur	Einrichter	86	2	(A)
Estampeur	Stanzer	90	2	A
Usinage mécanique	Mechanische Bearbeitung			
Mécanicien de machines	Maschinenmechaniker	80	-	-
Atelier de serrurerie	Schlosserei			
Serrurier / tôleur	Schlosser	95	2	A
Atelier de soudage	Schweisserei			
Soudeur par points	Punktschweisser	83	1	-
Soudeur sans outils à main	Schweisser, ohne Handwerkzeuge	86	2	(A)
Soudeur avec outils à main	Schweisser, mit Handwerkzeugen	95	2	A

Table 1: Example of the information contained in Suva's noise level tables.

Measures M1:

- Noise control plan, evaluation of noise control measures (feasibility, cost-effectiveness)
- Information of the employees about the hazard to hearing and hearing damage
- Instruction of the employees about safety measures
- Distribution of hearing protection devices
- Recommendation to use hearing protection devices
- Pregnant women are not allowed to work at such workplaces.

Measures M2 (in addition to measures M1):

- Realisation of noise control measures
- Signposts indicating clearly the obligation to use hearing protection devices
- Use of hearing protection devices is mandatory and must be enforced.

Hearing examinations:

(A) Hearing examination must be offered to the employee, but is not mandatory

A Hearing examination is mandatory

5 Conclusion

According to the experience in Switzerland, these noise level tables help smaller and medium-sized enterprises to evaluate the noise exposure of their employees in a very effective way. They are enabled to put their effort into effective hearing protection measures instead of noise measurements.

References

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- [2] Suva, Physics section
List of all the Noise Level Tables available
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- [3] Suva, Physics section
Noise Level Tables for all branches of the industry
www.suva.ch/waswo/86XXX
(exact number 86XXX see [2])



Fig. 2: One of Suva's five mobile hearing examination units or "Audiobiles"