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## OCCUPATIONAL NOISE CONTROL IN DENMARK

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In 1972 the Danish Labour Inspection Service established a noise limit of  $L_{eq}$  (40 hours) = 90 dB(A).

During the following years rather good results were obtained. Among others, a number of companies in the brewing-, woodworking- and concrete industries successfully entered into the process of noise control.

Noise control at breweries. In 1973-74 United Breweries (Carlsberg and Tuborg) carried out a 20 million kroner (approx. 3 million dollars) noise control project (1). As a result the noise level at the bottling halls in Denmark has been lowered from 95-100 dB(A) to 85-90 dB(A), generally speaking. At new plants the noise level hardly ever exceed 85 dB(A) (2).

From an economic point of view it is an important fact that Denmark holds a prominent position in the field of noise control at breweries. It leads to a significant export of know-how, low noise machinery and noise control equipment (3).

Other industries. A comprehensive noise control manual has been produced in respect of the woodworking industry (4) and a number of factories have lowered their noise level from 90-100 dB(A) to 80-90 dB(A).

In other fields too, for instance the concrete industry, much progress has been achieved in the 70th. Demands from the home market as well as from Swedish, German and American markets have brought about the development of advanced Danish low-noise concrete machines.

In the iron- and metalindustry the results are more mixed. Some firms have achieved exemplary noise-reduction in spite of heavy problems. Others have still not started the simplest forms of noise reduction.

Stagnating results. During the late seventies, however, the results became less marked partly as a result of the economic crises and partly because the more obstinate companies were by then being approached.

It is estimated that 36% of Danish industrial workers are today exposed to noise above 85 dB(A).

Noise control department. Consequently the Labour Inspection Service established in 1980 a special department dealing with noise control. One of the more important tasks is to communicate know how of noise and of its control. Furthermore an education programme for the inspectors of the Labour Inspection Districts has been started. High priority is also given to the national and international efforts to improve noise labelling of machinery (5).

In the long run this kind of activity is expected to accelerate the process of industrial noise control.

Future plans. The noise limit is planned lowered to 85 dB(A). It is, however, expected that due to economical considerations, the government will have to give a respite of several years in respect of the most noisy part of the existing machinery (3).

Until recently the efforts have been concentrated on hearing conservation. An investigation has shown that 38% of the Danish workers are troubled by noise. The combined effects of noise and other influences on the working environment are considered to be of great importance.

Combined effects. An understanding of the complexity of problems in the working environment has increased during the later years. The basis for these wider angles of approach to problems in the working environment is among other, that there is hardly ever one isolated reason for the problems that emerge in the workplace. This is particularly true in respect of psychological health problems. We often see, that two influences intensify each other, for instance the psychological effects of noise may be intensified by high speed.

Long term effects. We often find that psychological injuries to health show up following long periods of influence, as adults may be exposed to detrimental effects for a long time without showing effects of injury such as actual symptoms of illness (symptoms of depression etc.). When we talk about psychological effects due to noise we are mostly dealing with long term effects.

Interplay of reactions. Another aspect which has been increasingly acknowledged is the interplay between various symptoms and reactions. It has been proved that many influences result in both physical and psychological effects on health. Thus is true in respect of noise, various chemical substances, shift work, monotonous work and work at high speed. One type of injury may often lead to other types of injuries. For instance, persons suffering with impaired hearing may develop psychological effects and social problems as a result of this.

Registration of psychological stress in the working environment. The Danish Labour Inspection Service is at present working on development

of a registration routine in respect of psychological factors in the working environment. The object of this registration routine is to analyse a specific job according to a number of closely defined relevant aspects. One of these aspects is noise. The attention is directed towards the work to be performed, and not against the person who performs the job in question.

Conditions important to the psychological state of health. When evaluating psychological annoyances at a particular noise level this will include the following aspects to be observed:

- qualification requirements (for instance thinking ability, professional knowledge etc.)
- ability to concentrate
- requirement for emotional involvement during work
- opportunity for cooperation and social contact during work
- opportunity for independent work (for instance choice of time for work efforts, choice of work speed
- working-hours (shift work etc.)

Based on observation of these aspects and an evaluation and/or measurements of the noise level at the workplace in question, it is decided whether the noise level is acceptable from a health point of view.

Evaluation of psychological stress during work. The experiences with the registration routine, suggest to date, that noise is one of the important psychological factors in many types of jobs, in both the private and the public sector. Noise is one among other influences that may lead to severe stress-reactions.

#### REFERENCES

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