


# Measurement and calculation of exposure to noise on the workplace

NEN-EN-ISO 9612 describes the methods for the measurement and, if necessary, calculation the daily average exposure to noise. The action and limit values of the Working Conditions Decree are linked to daily average exposure. The standard distinguishes between three methods:

## 1 Task based method

Daily exposure is calculated on the basis of the measured noise level for each noise-relevant activity and the average duration of the activities per day. The task method is the preferred method.
The advantages of the task method are:

- the total measurement time is generally much shorter than with the other two methods
- the method provides the most information about the contribution of each task to the exposure and therefore offers the most support in policy, such as when setting priorities
- when updating a study, it is not always necessary to repeat everything
- the measurement does not necessarily have to be carried out on a representative day, although this is preferable
- the method is well suited to the use of a class 1 measuring instrument

Conditions for the task based strategy:

- a sufficiently reliable inventory of activities must be made, i.e. a list of all relevant activities and the average duration of each activity, and that for each equally exposed group
- the noise level for each activity must be measured in a sufficiently representative manner: measurements for each activity must be repeated a number of times (the number depends on various circumstances) and the differences in results must be verified
- depending on the number of employees performing the same activity, the measurements are distributed among different employees.

If it proves impossible to draw a clear inventory of activities, two methods can be used that involve measuring without distinguishing between the activities, as described on the following sections:

## 2 Job based strategy

Measurements are taken during random periods (samples) of equal duration, without analysing the work activities.

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Conditions for the job based strategy:

- there is a set of conditions relating to the total measurement time, but the absolute minimum measurement time is 6 hours (for a group with equal exposure) - if the number of employees in the group increases, the total measurement time increases up to the duration of one whole day
- the measurements are distributed among different employees; simultaneous measurements are possible
- there is a minimum duration for the random samples
- the working day must be sufficiently representative
- there is a final test for the distribution of the results

## 3 Full day strategy

In principle, measurements are taken throughout the entire working day, for a minimum of three full days for each equally exposed group.

Conditions for the full day strategy:

- there is a set of requirements regarding the distribution among employees
- the working day selected for the measurement must be sufficiently representative
- there is a final test for the distribution of the results

## 4 Assessment value

The Working Conditions Decree states that: 'When assessing the measurement results, account shall be taken of the measurement uncertainties, which are determined in accordance with standard measurement practice.'

The decree specifies the action and limit values as the daily average noise exposure $L_{EX,8h}$ as defined in ISO 1999. According to ISO 9612 (version 2025), 'standard practice' is that the measurement uncertainty $U$ is added to $L_{EX,8h}$ and that this is tested against the sum of the two, i.e. $L_{EX,8h} + U$. The measurement uncertainty is calculated on the basis of the spread in the measurement results and, in the task method, the spread in the duration of the work. The class of the sound level meter used also has a significant influence on measurement uncertainty $U$.

## 5 Instrumentation

The use of a class 1 sound level meter results in a lower value of measurement uncertainty $U$ and therefore in a lower final result against which action and limit values are tested. With the task method, it is obvious and practical to use a class 1 metre. A class 1 meter can also be used for longer measurements, for example in a backpack such as those used by athletes for hydration systems (hydration backpacks). Acceptance of this by employees sometimes encounters problems, especially in elevated temperatures. In addition, few agencies have multiple class 1 meters available for simultaneous measurement.

For the function and whole-day method, it is obvious to use a personal noise dosimeter. These are light and small and can be attached to the shoulder (they must be placed in the immediate vicinity of an ear). However, dosimeters are almost always class 2 and result in a significantly higher measurement uncertainty! This affects the assessment of the action and limit values and therefore the decisions that follow, see previous paragraph.

Finally, when using dosimeters, there is a high risk of non-representative contributions, and therefore a greater risk of measurement errors.

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