Annex 4:
Example of how to determine the rating level

In a foreman's office in a mechanical workshop (separate booth, with windows), there are three distinct phases depending on the production processes and machine utilisation, i.e.:

Phase 1: Background noise
(hydraulic systems, fans, idle machines)
Approx. 15% of the shift

Phase 2: Majority of the processing machinery in operation
Approx. 80% of the shift

Phase 3: Majority of the processing machinery and the guillotine shears in operation
Approx. 5% of the shift

Each of these phases is assumed to be a sub-interval and the sound exposure levels are calculated separately as described below.

- Sub-interval 1

An equivalent continuous sound exposure level $L_{pAeq,m}$ of 47.2 dB(A) is determined for the background noise (mean of two measurements). Since there is a hydraulic unit that makes one single, very distinct sound, an adjustment of 3 dB(A) is specified for the tonality and information content.

- Sub-interval 2

When the processing machinery is operating as usual, an equivalent continuous sound exposure level $L_{pAeq,m}$ of 61.8 dB(A) is determined (mean of two measurements). The noise is not felt to be tonal, i.e. no adjustments need to be made.

- Sub-interval 3

The guillotine shears are used at irregular intervals throughout the day. Since the results of the first two measurements of the equivalent continuous sound exposure level differ by 2.4 dB(A), a total of four measurements are taken in the booth. This yields a mean equivalent continuous sound exposure level $L_{pAeq,m}$ of 67.4 dB(A). The degree of the impulse K_I for each measurement is determined at the same time, producing a mean value of 4.3 dB(A).

The rating level can be calculated using the following formula

$$L_r = 10 \lg \left(\sum_{m=1}^{M} \frac{x_m}{100} 10^{0{,}1 \cdot L_{p,m}} \right) \text{dB(A)}$$

Table 40, which shows the levels for each sub-interval and their duration as a percentage, illustrates how the calculation is carried out.

Table 40:
Calculation of the rating level based on sub-interval levels

Activity m	Sub-interval level $L_{p,m}$ in dB(A)	Sub-interval duration x_m in %	Formula value $\frac{x_m}{100} \cdot 10^{0.1 \cdot L_{p,m}}$
1	47.2 + 3 = 50.2	15	$15.71 \cdot 10^3$
2	61.8 + 0 = 61.8	80	$1{,}210.85 \cdot 10^3$
3	67.4 + 4.3 = 71.7	5	$739.55 \cdot 10^3$
		Σ	**$1{,}966.11 \cdot 10^3$**

The values for each sub-interval are added together in the last column of the table to calculate a rating level L_r of approximately 63 dB(A) by means of a logarithm and multiplication by 10:

$L_r = 10 \lg (1{,}966.11 \cdot 10^3)$ dB = 62.9 dB(A)

Based on VDI Guideline 2058-3, Part 2 (see Section 8.4. of these recommendations), the workplace in the foreman's booth is suitable for "simple or predominantly mechanised office work".